PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-334820
(43)Date of publication of application : 04.12.2001

(51)Int.Cl. B60H 1/00
B60H 1/32

(21)Application number : 2000-158542
(22)Date of filing : 29.05.2000

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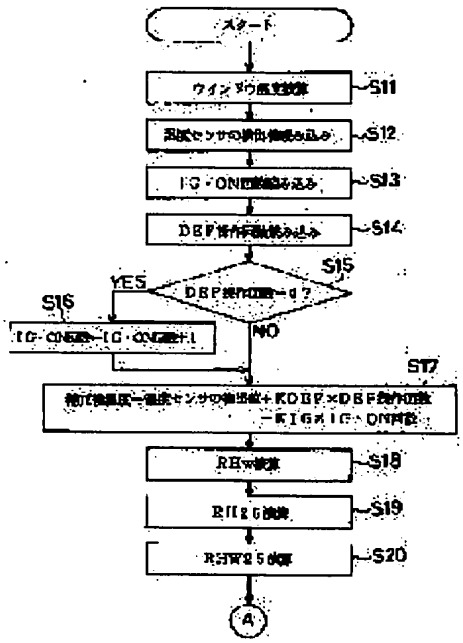
(54) VEHICLE AIR CONDITIONER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a relatively low cost vehicle air conditioner, in which a resistance to cloudiness, preventing or eliminating the cloudiness of inner surface of windshield, can be easily enhanced even in employment of an inexpensive temperature sensor having a large margin error.
SOLUTION: A detected value of a humidity sensor is read in. Subsequently, the times of ON at a IG switch (IG.ON times) is read in and the times of DEF switch operation is read in, for correction of the detected value of the humidity sensor. There is a possibility, for example, that the detected value of the humidity sensor may be lower than an actual relative humidity value in proportion to the times of DEF switch operation, so that the detected value of the humidity sensor is corrected to a higher value as an corrected humidity value. Then the corrected humidity value is compared to a determined value of the resistance to the cloudiness, which is acquired from a windshield temperature (window temperature) calculated by using neural net control and fuzzy control. According to a result of the comparison, serviceability ratio or blow out volume of a compressor is controlled.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

引用文献1

引用文献 1

(19)日本国特許庁（ＪＰ）　(12) 公開特許公報（Ａ）　(11)特許出願公開番号
特開2001－334820
（P2001－334820A）
(43)公開日　平成13年12月４日(2001.12.4)

(51)Int.Cl.⁷		識別記号	FI		テーマコード（参考）
Ｂ６０Ｈ	1/00	１０１	Ｂ６０Ｈ	1/00	１０１Ｚ　３Ｌ０１１
					１０１Ｃ
					１０１Ｋ
	1/32	６２３		1/32	６２３Ｚ
		６２４			６２４Ａ

審査請求　未請求　請求項の数40　ＯＬ　（全 31 頁）

(21)出願番号　特願2000－158542(P2000－158542)

(22)出願日　平成12年５月29日(2000.5.29)

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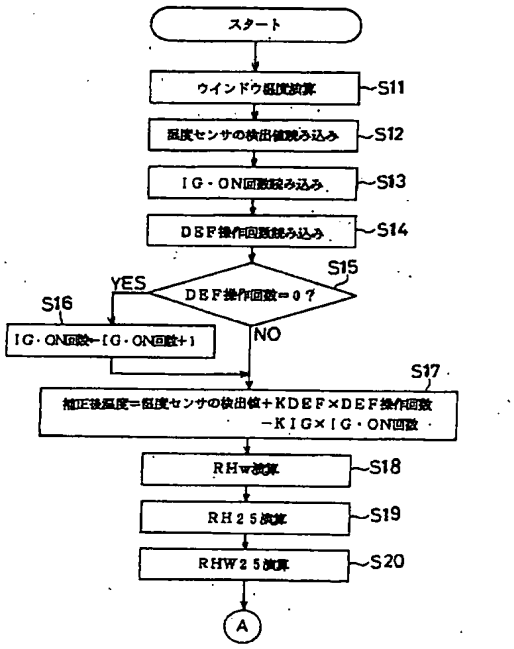
Ｆターム(参考)　3L011 AC00 AC01 AC02

(54)【発明の名称】　車両用空調装置

(57)【要約】
【課題】　誤差の大きい、安価な湿度センサを用いた場合でも、フロントウインドウガラスの内面の曇りを防止または除去する防曇性能を容易に高めることのできる比較的に低コストな車両用空調装置を提供する。
【解決手段】　湿度センサの検出値を読み込み、ＩＧスイッチのＯＮ回数（ＩＧ・ＯＮ回数）を読み込み、ＤＥＦスイッチの操作回数（ＤＥＦ操作回数）を読み込んで、湿度センサの検出値を補正する。例えばＤＥＦスイッチが押される程、湿度センサ検出値は実際の相対湿度に比べて低い値を示している可能性があるので、湿度センサ補正湿度値が高くなるように補正する。そして、ニューロ制御またはファジィ制御を用いて演算したフロントウインドウガラスの温度（ウインドウ温度）から求めた防曇判定値とその補正後湿度とを比較して、その比較結果に応じてコンプレッサの稼働率または吐出容量を制御するようにしている。



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【特許請求の範囲】

【請求項１】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、

（ｂ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある制御特性を記憶する記憶手段と、

（ｃ）乗員の操作または制御変更要求、あるいは前記記憶手段に記憶された制御特性に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、

前記防曇制御手段は、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある制御特性を変更することを特徴とする車両用空調装置。

【請求項２】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、

（ｂ）湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段と、

（ｃ）乗員の操作または制御変更要求、あるいは前記湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、

前記防曇制御手段は、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値を補正することを特徴とする車両用空調装置。

【請求項３】（ａ）冷媒を圧縮する圧縮機、および車室内に吹き出す空気を冷却して除湿する熱交換器を有する冷凍サイクルと、

（ｂ）乗員の操作または制御変更要求に応じて、前記圧縮機または前記熱交換器の制御状態を自動制御する防曇制御手段とを備え、

前記防曇制御手段は、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、前記圧縮機または前記熱交換器の稼働率または容量または作動条件のいずれか１つ以上の物理値を補正することを特徴とする車両用空調装置。

【請求項４】（ａ）ウインドウへ向けて空調風を吹き出す吹出口を有する空調ダクトと、

（ｂ）ウインドウへの空調風の吹き出しを含む吹出口モードへの変更条件またはウインドウへの吹出風量またはウインドウへの吹出割合のいずれか１つ以上の物理値を変更する吹出状態可変手段と、

（ｃ）乗員の操作または制御変更要求に応じて、前記吹出状態可変手段の制御状態を自動制御する防曇制御手段とを備え、

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前記防曇制御手段は、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、ウインドウへの空調風の吹き出しを含む吹出口モードへの変更条件またはウインドウへの空調風の風量またはウインドウへの空調風の吹出割合のいずれか１つ以上の物理値を補正することを特徴とする車両用空調装置。

【請求項５】（ａ）ウインドウへ向けて空調風を吹き出す吹出口を有する空調ダクトと、

（ｂ）ウインドウへの空調風の吹出温度を変更する吹出状態可変手段と、

（ｃ）乗員の操作または制御変更要求に応じて、前記吹出状態可変手段の制御状態を自動制御する防曇制御手段とを備え、

前記防曇制御手段は、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、ウインドウへの空調風の吹出温度を補正することを特徴とする車両用空調装置。

【請求項６】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、

（ｂ）ウインドウ温度を推定するウインドウ温度推定手段と、

（ｃ）乗員の操作または制御変更要求、あるいは前記ウインドウ温度推定手段にて推定されたウインドウ温度に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、

前記ウインドウ温度推定手段に、ファジィ制御またはニューロ制御のいずれか１つ以上を用いることを特徴とする車両用空調装置。

【請求項７】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、

（ｂ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある制御特性を記憶する記憶手段と、

（ｃ）乗員の操作または制御変更要求、あるいは前記記憶手段に記憶された制御特性に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、

前記防曇制御手段は、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある制御に、ファジィ制御またはニューロ制御のいずれか１つ以上を用いることを特徴とする車両用空調装置。

【請求項８】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、

（ｂ）車室内に吹き出す空気を冷却して除湿する熱交換器と、

（ｃ）乗員の操作または制御変更要求に応じて、前記熱交換器または前記熱交換器付近の目標温度を算出し、この算出した前記熱交換器または前記熱交換器付近の目標

温度に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、
前記防曇制御手段は、前記熱交換器または前記熱交換器付近の目標温度の算出に、ファジィ制御またはニューロ制御のいずれか１つ以上を用いることを特徴とする車両用空調装置。
【請求項９】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、
（ｂ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある物理量を検出する検出手段と、
（ｃ）乗員の操作または制御変更要求、あるいは前記検出手段の検出値に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、
前記防曇制御手段は、前記検出手段の検出値を、空調作動時間が推定可能なパラメータと共に変更して制御に用いることを特徴とする車両用空調装置。
【請求項１０】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、
（ｂ）湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段と、
（ｃ）乗員の操作または制御変更要求、あるいは前記湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、
前記防曇制御手段は、前記湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値を、空調作動時間が推定可能なパラメータと共に変更して制御に用いることを特徴とする車両用空調装置。
【請求項１１】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、
（ｂ）ウインドウ温度を推定するウインドウ温度推定手段と、
（ｃ）乗員の操作または制御変更要求、あるいは前記ウインドウ温度推定手段にて推定されたウインドウ温度に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、
前記ウインドウ温度推定手段を、空調作動時間が推定可能なパラメータと共に変更して制御に用いることを特徴とする車両用空調装置。
【請求項１２】請求項１ないし請求項５のうちいずれかに記載の車両用空調装置において、
前記変更量または補正量の算出に、ファジィ制御またはニューロ制御のいずれか１つ以上を用いることを特徴とする車両用空調装置。
【請求項１３】請求項１ないし請求項５のうちいずれかに記載の車両用空調装置において、
前記乗員の操作または制御変更要求とは、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去手段であることを特徴とする車両用空調装置。
【請求項１４】請求項１３に記載の車両用空調装置において、
前記窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去手段は、ウインドウへの空調風の吹き出しを選択するデフロスタ選択手段またはウインドウへの空調風の吹き出しを含む吹出口モードを選択するフットデフ選択手段またはウインドウを加熱するウインドウ加熱手段であることを特徴とする車両用空調装置。
【請求項１５】請求項１ないし請求項１４のうちいずれかに記載の車両用空調装置において、
前記乗員の操作または制御変更要求を反映するのは、乗員の操作または制御変更要求をしてから所定時間が経過した後であることを特徴とする車両用空調装置。
【請求項１６】請求項１ないし請求項１３のうちいずれかに記載の車両用空調装置において、
前記乗員の操作または制御変更要求が第１の所定回数に達するまでの間は、前記乗員の操作または制御変更要求が前記第１の所定回数に達した後に比べて、前記変更量または補正量を少なくすることを特徴とする車両用空調装置。
【請求項１７】請求項１ないし請求項１６のうちいずれかに記載の車両用空調装置において、
前記乗員の操作または制御変更要求が第２の所定回数に達した後は、前記乗員の操作または制御変更要求が前記第２の所定回数に達する前に比べて、前記変更量または補正量を少なくすることを特徴とする車両用空調装置。
【請求項１８】請求項１ないし請求項１７のうちいずれかに記載の車両用空調装置において、
前記変更量または補正量を、視覚表示または聴覚表示する表示手段を設けたことを特徴とする車両用空調装置。
【請求項１９】請求項１ないし請求項１８のうちいずれかに記載の車両用空調装置において、
前記変更量または補正量を、前記窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去手段以外の方法で、変更または調整可能な変更手段または調整手段を設けたことを特徴とする車両用空調装置。
【請求項２０】請求項１９に記載の車両用空調装置において、
前記変更量または補正量を、前記窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去手段以外の方法とは、少なくとも複数の入力手段の同時入力を含むことを特徴とする車両用空調装置。
【請求項２１】請求項１ないし請求項２０のうちいずれかに記載の車両用空調装置において、
前記変更または補正は、前記過去の乗員の操作または制御変更要求が行われた条件付近で行われることを特徴と

する車両用空調装置。

【請求項２２】請求項９ないし請求項１１のうちいずれかに記載の車両用空調装置において、

前記空調作動時間が推定可能なパラメータが第１の所定値に達するまでの間は、前記空調作動時間が推定可能なパラメータが第１の所定値に達した後に比べて、前記変更量を少なくすることを特徴とする車両用空調装置。

【請求項２３】請求項９ないし請求項１１または請求項２２のうちいずれかに記載の車両用空調装置において、

前記空調作動時間が推定可能なパラメータが第２の所定値以上に達した後は、前記空調作動時間が推定可能なパラメータが第２の所定値以上に達する前に比べて、前記変更量を少なくすることを特徴とする車両用空調装置。

【請求項２４】請求項９ないし請求項１１または請求項２２または請求項２３のうちいずれかに記載の車両用空調装置において、

前記空調作動時間が推定可能なパラメータとは、バッテリ投入以後または車両駆動手段作動以後または空調作動以後または送風作動以後のうちのいずれか１つ以上の経過時間、あるいは車両駆動手段作動回数またはイグニッションＯＮ回数またはアクセサリ電源ＯＮ回数またはスタータＯＮ回数のうちのいずれか１つ以上の回数であることを特徴とする車両用空調装置。

【請求項２５】請求項１ないし請求項２４のうちいずれかに記載の車両用空調装置において、

前記変更または補正を行う条件を、ファジィ制御またはニューロ制御のいずれか１つ以上を用いて算出することを特徴とする車両用空調装置。

【請求項２６】請求項６ないし請求項８または請求項１２または請求項２５のうちいずれかに記載の車両用空調装置において、

前記ファジィ制御またはニューロ制御のいずれか１つ以上の入力データとして、外気温または車速または室温または日射量または吹出口モードのうちの１つ以上を用いることを特徴とする車両用空調装置。

【請求項２７】請求項１ないし請求項２６のうちいずれかに記載の車両用空調装置において、

車両駆動手段冷却手段の温度または熱交換器温度が所定値以下の時は、所定値以上の時に比べて、前記乗員の操作または制御変更要求の制御への反映量を少なくすることを特徴とする車両用空調装置。

【請求項２８】請求項１ないし請求項２７のうちいずれかに記載の車両用空調装置において、

バッテリ投入以後または車両駆動手段作動以後または空調作動以後または送風作動以後の経過時間が所定値以下の時は、所定値以上の時に比べて、前記乗員の操作または制御変更要求の制御への反映量を少なくすることを特徴とする車両用空調装置。

【請求項２９】請求項１ないし請求項２８のうちいずれかに記載の車両用空調装置において、

前記窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある検出手段の検出値は、時間と共に、窓曇りが起き易い方向に変更されることを特徴とする車両用空調装置。

【請求項３０】請求項１ないし請求項２９のうちいずれかに記載の車両用空調装置において、

前記湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値は、時間と共に、窓曇りが起き易い方向に変更されることを特徴とする車両用空調装置。

【請求項３１】請求項１ないし請求項３０のうちいずれかに記載の車両用空調装置において、

前記ウインドウ温度推定手段は、時間と共に、窓曇りが起き易い方向に変更されることを特徴とする車両用空調装置。

【請求項３２】請求項１ないし請求項３１のうちいずれかに記載の車両用空調装置において、

前記乗員の操作または制御変更要求後は、前記乗員の操作または制御変更要求前に比べて、前記時間と共に変更される窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある検出手段の検出値の変更量を少なくすることを特徴とする車両用空調装置。

【請求項３３】請求項１ないし請求項３２のうちいずれかに記載の車両用空調装置において、

前記乗員の操作または制御変更要求後は、前記乗員の操作または制御変更要求前に比べて、前記時間と共に変更される前記湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値の変更量を少なくすることを特徴とする車両用空調装置。

【請求項３４】請求項１ないし請求項３３のうちいずれかに記載の車両用空調装置において、

前記乗員の操作または制御変更要求後は、前記乗員の操作または制御変更要求前に比べて、前記時間と共に変更される前記ウインドウ温度推定手段の変更量を少なくすることを特徴とする車両用空調装置。

【請求項３５】請求項１ないし請求項３４のうちいずれかに記載の車両用空調装置において、

前記過去の乗員の操作または制御変更要求に応じて変更または補正する変更量または補正量を、前記湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値に応じて変更することを特徴とする車両用空調装置。

【請求項３６】請求項１ないし請求項３５のうちいずれかに記載の車両用空調装置において、

前記過去の乗員の操作または制御変更要求に応じて変更または補正する変更量または補正量を、前記湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値が、

予め想定した窓曇り発生値と離れている程、多く変更ま

たは補正することを特徴とする車両用空調装置。

【請求項３７】請求項１ないし請求項３６のうちいずれかに記載の車両用空調装置において、

雨天または降雪時であると推定または検出した時は、雨天または降雪時ではないと推定または検出した時に比べて、前記過去の乗員の操作または制御変更要求に応じて変更または補正する変更量または補正量を多くすることを特徴とする車両用空調装置。

【請求項３８】（ａ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータと、

（ｂ）窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある物理量を検出する検出手段と、

（ｃ）乗員の操作または制御変更要求、あるいは前記検出手段の検出値に応じて、前記アクチュエータの制御状態を自動制御する防曇制御手段とを備え、

前記防曇制御手段は、雨天または降雪時であると推定または検出した回数に応じて、前記検出手段の検出値を変更して制御に用いることを特徴とする車両用空調装置。

【請求項３９】請求項１ないし請求項３８のうちいずれかに記載の車両用空調装置において、

雨天または降雪時であると推定または検出した回数が少ない時は、雨天または降雪時であると推定または検出した回数が多い時に比べて、前記ウインドウ温度推定手段の補正量を少なくすることを特徴とする車両用空調装置。

【請求項４０】請求項１ないし請求項３９のうちいずれかに記載の車両用空調装置において、

雨天または降雪時であると推定または検出した回数が少ない時は、雨天または降雪時であると推定または検出した回数が多い時に比べて、前記過去の乗員の操作または制御変更要求に応じて変更または補正する変更量または補正量を少なくすることを特徴とする車両用空調装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、湿度センサの検出値に応じて、ウインドウの防曇制御を行う車両用空調装置に関するもので、特に誤差の大きい低コストな湿度センサでも高い防曇性能を得ることが可能な車両用空調装置に係わる。

【０００２】

【従来の技術】従来より、車両用空調装置は、あらゆる気候、走行条件において乗員に快適な環境をもたらし、且つ窓曇りまたは霜付きを防止し、あるいは窓曇りまたは霜の除去を行って、運転者の視界を確保し、安全で快適な運転を可能とすることを目的としている。

【０００３】従来より、特開平８－８５３３６号公報においては、車室内の湿度センサの検出値から車室内の絶対湿度を求め、この絶対湿度と窓ガラスにおける飽和絶対湿度との比較結果に基づいて窓ガラスが曇り易いと判断したら、外気導入量を多くして窓ガラスが曇らないように制御し、窓ガラスが曇り難いと判断したらコンプレッサが無駄に電力を消費しないように外気導入量を少なくして、コンプレッサの稼働率を減らして燃費を改善できるように制御している車両用空調装置が提案されている。また、この車両用空調装置は、上述の防曇制御を正確に実施するために、誤差の非常に小さい湿度センサを採用している。

【０００４】

【発明が解決しようとする課題】ところが、誤差の小さい湿度センサは、非常に高コストである上、どうしてもある程度の誤差はあるため、正確な防曇制御が出来ず、窓ガラスの曇りが発生したり、コンプレッサの稼働率が上がって燃費が悪化するという問題がある。また、正確な防曇制御にはウインドウ温度（ウインドウガラスの露点温度）の推定が必要であるが、特開平７－１７９１２０号公報にあるように、ウインドウ温度を正確に推定するのに必要なパラメータは、例えば内気温、外気温、日射量や車速等のように非常に多く、ウインドウ温度の算出式の作成が非常に困難であった。

【０００５】

【発明の目的】本発明の目的は、高コストの湿度センサを用いることなく、過去の乗員の操作または制御変更要求等により防曇制御の制御特性または湿度センサの検出値を補正することで、低コストで正確で且つ容易に窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を効率よくまたは精度良く行うことのできる車両用空調装置を提供することにある。また、ウインドウ温度の算出式の作成を非常に容易に行うことのできる車両用空調装置を提供することにある。さらに、誤差の大きい、安価な湿度センサを用いた場合でも、窓曇りまたは霜付きを防止、あるいは窓曇りまたは霜を除去する防曇性能を容易に高めることができる比較的に低コストな車両用空調装置を提供することにある。

【０００６】

【課題を解決するための手段】請求項１に記載の発明によれば、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある制御特性を変更することにより、誤差が大きく、安価なセンサを用いても、過去の乗員の操作または制御変更要求の学習効果により高い防曇性能を得ることができる。

【０００７】請求項２に記載の発明によれば、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値を補正することにより、誤差が大きく、安価なセンサを用いても、過去の乗員の操作または制御変更要求の学習効果により高い防曇性能を得ることができる。

【０００８】請求項３に記載の発明によれば、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、圧縮機または熱交換器の稼働率または容量または作動条件のいずれか１つ以上の物理値を補正することにより、誤差が大きく、安価なセンサを用いても、過去の乗員の操作または制御変更要求の学習効果により高い防曇性能を得ることができる。

【０００９】請求項４に記載の発明によれば、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、ウインドウへの空調風の吹き出しを含む吹出口モードへの変更条件またはウインドウへの空調風の風量またはウインドウへの空調風の吹出割合のいずれか１つ以上の物理値を補正することにより、誤差が大きく、安価なセンサを用いても、過去の乗員の操作または制御変更要求の学習効果により高い防曇性能を得ることができる。

【００１０】請求項５に記載の発明によれば、過去の乗員の操作または制御変更要求を学習し、その学習結果に応じて、ウインドウへの空調風の吹出温度を補正することにより、誤差が大きく、安価なセンサを用いても、過去の乗員の操作または制御変更要求の学習効果により高い防曇性能を得ることができる。また、請求項６ないし請求項８のうちのいずれかに記載の発明によれば、ウインドウ温度推定手段、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある制御に、熱交換器または熱交換器付近の目標温度の算出に、ファジィ制御またはニューロ制御のいずれか１つ以上を適用することにより、どの条件で窓曇りが発生したかをプロットしてゆくだけで、容易に最適な防曇制御を行うことができる。さらに、ウインドウ温度推定または熱交換器または熱交換器付近の目標温度の算出式の作成を非常に容易に行うことができる。

【００１１】請求項９ないし請求項１１のうちのいずれかに記載の発明によれば、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある物理量を検出する検出手段の検出値、湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値、あるいはウインドウ温度推定手段を、空調作動時間が推定可能なパラメータと共に変更して防曇制御に用いることにより、最適なコンプレッサ稼働率を設定することができる。また、請求項１２に記載の発明によれば、変更量または補正量の算出に、ファジィ制御またはニューロ制御のいずれか１つ以上を用いることにより、どの条件で窓曇りが発生したかをプロットしてゆくだけで、容易に最適な防曇制御を行うことができる。さらに、請求項１３に記載の発明によれば、乗員の操作または制御変更要求とは、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去手段であることを特徴としている。

【００１２】請求項１４に記載の発明によれば、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去手段として、ウインドウへの空調風の吹き出しを選択するデフロスタ選択手段またはウインドウへの空調風の吹き出しを含む吹出口モードを選択するフットデフ選択手段またはウインドウを加熱するウインドウ加熱手段を用いても良い。また、請求項１５に記載の発明によれば、乗員の操作または制御変更要求を反映するのは、乗員の操作または制御変更要求をしてから所定時間が経過した後とすることにより、誤操作または誤制御変更要求による不具合を防止することができる。

【００１３】請求項１６に記載の発明によれば、乗員の操作または制御変更要求が第１の所定回数に達するまでの間は、乗員の操作または制御変更要求が第１の所定回数に達した後に比べて、変更量または補正量を少なくすることにより、急激に防曇制御の制御特性が変化することを防止できる。また、請求項１７に記載の発明によれば、乗員の操作または制御変更要求が第２の所定回数に達した後は、乗員の操作または制御変更要求が第２の所定回数に達する前に比べて、変更量または補正量を少なくすることにより、急激に防曇制御の制御特性が変化することを防止できる。さらに、請求項１８に記載の発明によれば、変更量または補正量を、視覚表示または聴覚表示する表示手段を設けることにより、乗員の空調感覚に合った防曇制御になっていることを乗員が実感または確認することができる。

【００１４】請求項１９に記載の発明によれば、変更量または補正量を、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去手段以外の方法で、変更または調整可能な変更手段または調整手段を設けるようにしても良い。また、請求項２０に記載の発明によれば、変更量または補正量を、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去手段以外の方法とは、少なくとも複数の入力手段の同時入力を含むようにしても良い。さらに、請求項２１に記載の発明によれば、変更または補正は、過去の乗員の操作または制御変更要求が行われた条件付近で行われるようにしても良い。

【００１５】請求項２２に記載の発明によれば、空調作動時間が推定可能なパラメータが第１の所定値に達するまでの間は、空調作動時間が推定可能なパラメータが第１の所定値に達した後に比べて、変更量を少なくすることにより、急激に防曇制御の制御特性が変化することを防止できる。また、請求項２３に記載の発明によれば、空調作動時間が推定可能なパラメータが第２の所定値以上に達した後は、空調作動時間が推定可能なパラメータが第２の所定値以上に達する前に比べて、変更量を少なくすることにより、急激に防曇制御の制御特性が変化することを防止できる。さらに、請求項２４に記載の発明によれば、空調作動時間が推定可能なパラメータとは、バッテリ投入以後または車両駆動手段作動以後または空調作動以後または送風作動以後のうちのいずれか１つ以

上の経過時間、あるいは車両駆動手段作動回数またはイグニッションＯＮ回数またはアクセサリ電源ＯＮ回数またはスタータＯＮ回数のうちのいずれか１つ以上の回数としても良い。

【００１６】請求項２５に記載の発明によれば、変更または補正を行う条件を、ファジィ制御またはニューロ制御のいずれか１つ以上を用いて算出することにより、容易に最適な防曇制御を行うことができる。また、請求項２６に記載の発明によれば、ファジィ制御またはニューロ制御のいずれか１つ以上の入力データとして、外気温または車速または室温または日射量または吹出口モードのうちの１つ以上を用いても良い。さらに、請求項２７に記載の発明によれば、車両駆動手段冷却手段の温度または熱交換器温度が所定値以下の時は、所定値以上の時に比べて、乗員の操作または制御変更要求の制御への反映量を少なくすることを特徴としている。ここで、車両駆動手段冷却手段の温度とは、車両に搭載されたエンジンを冷却する冷却水の温度、あるいは車両に搭載された走行用モータを冷却する冷却水の温度である。また、熱交換器温度とは、冷凍サイクルのエバポレータの表面温度またはエバ後温度、あるいは電気部品等の発熱部品の排熱を回収する排熱回収器の表面温度である。

【００１７】請求項２８に記載の発明によれば、バッテリ投入以後または車両駆動手段作動以後または空調作動以後または送風作動以後の経過時間が所定値以下の時は、所定値以上の時に比べて、乗員の操作または制御変更要求の制御への反映量を少なくすることにより、急激に防曇制御の制御特性が変化することを防止できる。また、請求項２９に記載の発明によれば、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある検出手段の検出値を、時間と共に、窓曇りが起き易い方向に変更するようにしても良い。さらに、請求項３０に記載の発明によれば、湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値を、時間と共に、窓曇りが起き易い方向に変更するようにしても良い。さらに、請求項３１に記載の発明によれば、ウインドウ温度推定手段を、時間と共に、窓曇りが起き易い方向に変更するようにしても良い。

【００１８】請求項３２に記載の発明によれば、乗員の操作または制御変更要求後は、乗員の操作または制御変更要求前に比べて、時間と共に変更される窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある検出手段の検出値の変更量を少なくすることにより、急激に防曇制御の制御特性が変化することを防止できる。また、請求項３３に記載の発明によれば、乗員の操作または制御変更要求後は、乗員の操作または制御変更要求前に比べて、時間と共に変更される湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値の変更量を少なくすることにより、急激に防曇制御の制御特性が変化することを防止できる。さらに、請求項３４に記載の発明によれば、乗員の操作または制御変更要求後は、乗員の操作または制御変更要求前に比べて、時間と共に変更されるウインドウ温度推定手段の変更量を少なくすることにより、急激に防曇制御の制御特性が変化することを防止できる。

【００１９】請求項３５に記載の発明によれば、過去の乗員の操作または制御変更要求に応じて変更または補正する変更量または補正量を、湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値に応じて変更するようにしても良い。また、請求項３６に記載の発明によれば、過去の乗員の操作または制御変更要求に応じて変更または補正する変更量または補正量を、湿度またはウインドウの結露またはウインドウ透過度またはウインドウ温度検出手段のいずれか１つ以上の検出値が、予め想定した窓曇り発生値と離れている程、多く変更または補正するようにしても良い。

【００２０】請求項３７に記載の発明によれば、雨天または降雪時であると推定または検出した時は、ウインドウ温度が外気温とほぼ等しくなることが分かっているので、雨天または降雪時であると推定または検出した時は、雨天または降雪時ではないと推定または検出した時に比べて、過去の乗員の操作または制御変更要求に応じて変更または補正する変更量または補正量を多くすることにより、防曇制御の制御特性を速やかに乗員の空調感覚に合わせることができる。また、請求項３８に記載の発明によれば、雨天または降雪時であると推定または検出した回数に応じて、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある物理量を検出する検出手段の検出値を変更して制御に用いることにより、誤差の多い安価な検出手段を用いた場合でも、防曇制御の制御特性を乗員の空調感覚に合わせることができる。

【００２１】請求項３９に記載の発明によれば、雨天または降雪時であると推定または検出した時は、ウインドウ温度が外気温とほぼ等しくなることが分かっているので、雨天または降雪時であると推定または検出した回数が少ない時は、雨天または降雪時であると推定または検出した回数が多い時に比べて、ウインドウ温度推定手段の補正量を少なくすることが望ましい。また、請求項４０に記載の発明によれば、雨天または降雪時であると推定または検出した回数が少ない時は、雨天または降雪時であると推定または検出した回数が多い時に比べて、過去の乗員の操作または制御変更要求に応じて変更または補正する変更量または補正量を少なくしても良い。

【００２２】

【発明の実施の形態】〔第１実施形態の構成〕図１ないし図１８は本発明の第１実施形態を示したもので、図２

は空調ユニットの全体構成を示した図で、図３は車両のインストルメントパネルを示した図で、図４はエアコン操作パネルを示した図である。

【００２３】本実施形態の車両用空調装置は、エンジンを搭載する自動車等の車両の車室内を空調する空調ユニット１における各空調機器のアクチュエータを、空調制御装置（制御回路基板：以下エアコンＥＣＵと言う）１０によって制御するように構成されている。その空調ユニット１は、車室内の運転席（車両右側の後部座席を含む）側の空調ゾーンと助手席（車両左側の後部座席を含む）側の空調ゾーンとの温度調節および吹出口モードの変更を互いに独立して行うことが可能なエアコンユニットである。

【００２４】空調ユニット１は、車両の車室内の前方に配置された空調ダクト２を備えている。この空調ダクト２の上流側には、内外気切替ドア３およびブロワ４とが設けられている。内外気切替ドア３は、サーボモータ５等のアクチュエータにより駆動されて内気吸込口６と外気吸込口７との開度（所謂吸込口モード）を変更する吸込口切替手段である。ブロワ４は、ブロワ駆動回路８により制御されるブロワモータ９により回転駆動されて空調ダクト２内において車室内に向かう空気流を発生させる遠心式送風機である。

【００２５】空調ダクト２の中央部には、空調ダクト２内を通過する空気を冷却する本発明の熱交換器（空調機器）を構成するエバポレータ（冷却用熱交換器）４１が設けられている。また、そのエバポレータ４１の下流側には、第１、第２空気通路１１、１２を通過する空気を加熱するヒータコア（加熱用熱交換器）４２が設けられている。なお、第１空気通路１１および第２空気通路１２は仕切り板１４により区画されている。そのヒータコア４２の下流側には、車室内の運転席側空調ゾーンと助手席側空調ゾーンとの温度調節を互いに独立して行うための運転席側、助手席側エアミックス（Ａ／Ｍ）ドア１５、１６が設けられている。そして、運転席側、助手席側Ａ／Ｍドア１５、１６は、サーボモータ１７、１８等のアクチュエータにより駆動されて、運転席側、助手席側に向けて吹き出す空気の吹出温度を調節する。

【００２６】ここで、本実施形態のエバポレータ４１は、冷凍サイクルの一構成部品を成すものである。冷凍サイクルは、車両のエンジンルーム内に搭載された車両走行用のエンジンの出力軸にベルト駆動されて、冷媒を圧縮して吐出する冷媒圧縮機（コンプレッサ）と、このコンプレッサから吐出された冷媒を凝縮液化させる冷媒凝縮器（コンデンサ）と、このコンデンサから流入した液冷媒を気液分離する受液器（レシーバ）と、このレシーバから流入した液冷媒を断熱膨張させる膨張弁と、この膨張弁から流入した気液二相状態の冷媒を蒸発気化させる上記のエバポレータ（冷媒蒸発器）４１とから構成されている。

【００２７】これらのうちコンプレッサは、本発明の空調機器（アクチュエータ）に相当するもので、エアコンＥＣＵ１０により制御される電磁クラッチ（本発明のアクチュエータに相当する）によって、エンジンからの回転動力が断続される。そして、電磁クラッチがＯＮされてコンプレッサが起動することによってエバポレータ４１が空調ダクト２内を通過する空気を冷却し除湿する。また、本実施形態では、エバ後温度センサ７４の検出値であるエバ後温度（ＴＥ）と目標エバ後温度（ＴＥＯ）との比較結果に応じて出力される制御信号に基づき容量可変制御を行う電磁式容量制御弁を有する容量可変型コンプレッサが用いられている。

【００２８】そして、第１空気通路１１の空気下流側に連通する各吹出ダクトの空気下流端（インストルメントパネル５０の前面）では、図２および図３に示したように、運転席側のフロントウインドウガラスの内面に向けて空調風を吹き出すための運転席側デフロスタ（ＤｒＤＥＦ）吹出口２０と、運転席側の乗員の頭胸部やサイドウインドウガラスの内面に向けて空調風を吹き出すための運転席側センターフェイス（ＤｒＦＡＣＥ）吹出口２１および運転席側サイドフェイス（ＤｒＦＡＣＥ）吹出口２２と、運転席側の乗員の足元部に向けて空調風を吹き出すための運転席側フット（ＤｒＦＯＯＴ）吹出口２３とが開口している。

【００２９】また、第２空気通路１２の空気下流側に連通する各吹出ダクトの空気下流端（インストルメントパネル５０の前面）では、助手席側のフロントウインドウガラスの内面に向けて空調風を吹き出すための助手席側デフロスタ（ＰａＤＥＦ）吹出口３０と、助手席側の乗員の頭胸部やサイドウインドウガラスの内面に向けて空調風を吹き出すための助手席側センターフェイス（ＰａＦＡＣＥ）吹出口３１および助手席側サイドフェイス（ＰａＦＡＣＥ）吹出口３２と、助手席側の乗員の足元部に向けて空調風を吹き出すための助手席側フット（ＰａＦＯＯＴ）吹出口３３とが開口している。

【００３０】そして、第１、第２空気通路１１、１２内には、車室内の運転席側と助手席側との吹出口モードの設定を互いに独立して行うための運転席側、助手席側吹出口切替ドア２４～２６、３４～３６が設けられている。そして、運転席側、助手席側吹出口切替ドア２４～２６、３４～３６は、サーボモータ２８、２９、３８、３９等のアクチュエータにより駆動されて運転席側、助手席側の吹出口モードをそれぞれ切り替えるモード切替ドアである。ここで、運転席側、助手席側の吹出口モードとしては、ＦＡＣＥモード、Ｂ／Ｌモード、ＦＯＯＴモード、Ｆ／Ｄモード、ＤＥＦモード等がある。

【００３１】なお、運転席側、助手席側吹出口切替ドア２４、３４は、ＤｒＤＥＦ吹出口２０、ＰａＤＥＦ吹出口３０を互いに独立して開閉することが可能な運転席側、助手席側デフロスタドア（空調機器）で、そのサー

ボモータ２８、３８は、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去を行う空調機器のアクチュエータを構成する。そして、ＤｒＦＡＣＥ吹出口２１、２２およびＰａＦＡＣＥ吹出口３１、３２を形成するセンターグリルおよびサイドグリルには、各吹出口から吹き出す空調風の吹出方向を変更することが可能な複数のスイングルーバがそれぞれ取り付けられている。

【００３２】エアコンＥＣＵ１０は、本発明の記憶手段、ウインドウ温度検出手段、ウインドウ温度推定手段、防曇制御手段に相当するもので、エンジンの始動および停止を司るイグニッションスイッチが投入（ＩＧ・ＯＮ）された時に、車両に搭載された車載電源であるバッテリ（図示せず）から直流電源が供給されると演算処理や制御処理を開始するように構成されている。エアコンＥＣＵ１０には、図２および図４に示したように、車室内前面のインストルメントパネル５０に一体的に設置されたエアコン操作パネル５１上の各種スイッチからの各スイッチ信号が入力される。

【００３３】そして、エアコン操作パネル５１には、液晶表示装置（ディスプレイ）５２、吸込口モード切替スイッチ５３、フロントデフロスタスイッチ（以下ＤＥＦスイッチと言う）５４、リヤデフロスタ（デフォッガ）スイッチ５５、ＤＵＡＬスイッチ５６、吹出口モード（ＭＯＤＥ）切替スイッチ５７、ブロワ風量切替スイッチ５８、ＡＵＴＯスイッチ６０、ＯＦＦスイッチ６１、Ａ／Ｃスイッチ５９、運転席（ＤＲＩＶＥＲ）側温度設定スイッチ６２および助手席（ＰＳＳＥＮＧＥＲ）側温度設定スイッチ６３等が設置されている。上記のうちのＤＵＡＬスイッチ５６は、運転席側空調ゾーン内の温度調節と助手席側空調ゾーン内の温度調節とを互いに独立して行う左右独立温度コントロールを指令する左右独立制御指令手段である。また、ＭＯＤＥ切替スイッチ５７は、乗員の操作に応じて、吹出口モードをＦＡＣＥモード、Ｂ／Ｌモード、ＦＯＯＴモードまたはＦ／Ｄモードに切り替える。

【００３４】そして、ディスプレイ５２には、運転席側、助手席側の空調ゾーンの設定温度、吹出口モードおよびブロワ風量等が表示される。そして、運転席側温度設定スイッチ６２は、運転席側空調ゾーン内の温度を所望の温度に設定するための運転席側温度設定手段で、アップスイッチ６２ａとダウンスイッチ６２ｂよりなる。また、助手席側温度設定スイッチ６３は、助手席側空調ゾーン内の温度を所望の温度に設定するための助手席側温度設定手段で、アップスイッチ６３ａとダウンスイッチ６３ｂよりなる。なお、エアコン操作パネル５１上の各種の操作スイッチは、ディスプレイ５２上に設けられていても良い。

【００３５】また、エアコンＥＣＵ１０の内部には、ＣＰＵ、メモリ（ＲＯＭまたはＥＥＰＲＯＭ、ＲＡＭ）、およびＩ／Ｏポート（入力／出力回路）等の機能を含んで構成される周知のマイクロコンピュータが設けられ、各種センサからのセンサ信号が入力回路によってＡ／Ｄ変換された後に、マイクロコンピュータに入力されるように構成されている。すなわち、エアコンＥＣＵ１０の入力回路には、車室内の空気温度（内気温、以下室温とも言う）を検出する内気温検出手段としての内気温センサ７１、車室外の空気温度（以下外気温と言う）を検出する外気温検出手段としての外気温センサ７２、および運転席側、助手席側空調ゾーン内に照射される日射量（日射強度）を検出する日射検出手段としての日射センサ７３等が接続されている。

【００３６】また、エアコンＥＣＵ１０の入力回路には、エバポレータ４１を通過した直後の空気温度（以下エバ後温度と言う）を検出するエバ後温度検出手段としてのエバ後温度センサ７４、車両のエンジンの冷却水温を検出する冷却水温検出手段としての冷却水温センサ７５、乗員付近相対湿度（車室内の相対湿度）を検出する湿度検出手段としての湿度センサ７６、車両の走行速度（車速）を検出する車速検出手段としての車速センサ７７等が接続されている。

【００３７】これらのうち日射センサ７３は、車室内の最前方側のフロントウインド近傍のインストルメントパネル５０上に設置されている。なお、日射センサ７３は、運転席側空調ゾーン内に照射される日射量（日射強度）を検知し、その日射強度に対応した出力信号ＴＳ’（Ｄｒ）を発生する運転席側日射強度検知手段（例えばフォトダイオード）と、助手席側空調ゾーン内に照射される日射量（日射強度）を検知し、その日射強度に対応した出力信号ＴＳ’（Ｐａ）を発生する助手席側日射強度検知手段（例えばフォトダイオード）とを有している。ここで、本実施形態の湿度センサ７６は、誤差の大きい低価格のもので、内気温センサ７１と共に、運転席近傍のインストルメントパネル５０の前面に形成された凹所内に収容されている。なお、凹所は通気口が形成された蓋体５０ａによって塞がれている。

【００３８】〔第１実施形態の制御方法〕次に、本実施形態のエアコンＥＣＵ１０による空調制御方法を、図１ないし図１８に基づいて説明する。ここで、図５はエアコンＥＣＵ１０の制御プログラムの一例を示したフローチャートである。

【００３９】先ず、イグニッションスイッチがＯＮされてエアコンＥＣＵ１０に直流電源が供給されると、予めＲＯＭに記憶されている制御プログラム（図５のルーチン）の実行が開始される。このとき、先ず、エアコンＥＣＵ１０内部のマイクロコンピュータに内蔵されたデータ処理用メモリ（ＲＡＭ）の記憶内容等の初期化を行う（ステップＳ１）。次に、各種データをデータ処理用メモリ（ＲＡＭ）に読み込む。すなわち、各種操作スイッチからのスイッチ信号や各種センサからのセンサ信号を入力する（ステップＳ２）。

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【００４０】特に、内気温センサ７１の検出値である内気温に対応した出力信号（内気温信号）ＴＲ、外気温センサ７２の検出値である外気温に対応した出力信号（外気温信号）ＴＡＭ、車速センサ７７の検出値である車速に対応した出力信号（車速信号）ＳＰＤ等を入力してデータ処理用メモリに記憶する。また、日射センサ７３の検出値である日射量（日射強度）に対応した出力信号（日射センサ信号）ＴＳ'（Ｄｒ）、ＴＳ'（Ｐａ）等を入力してデータ処理用メモリに記憶する。

【００４１】次に、上記のステップＳ２で記憶した日射＊センサ信号ＴＳ'（Ｄｒ）、ＴＳ'（Ｐａ）に対してＴ１（ｓｅｃ）の時定数（遅れ）によって算出される日射強度ＴＳ（Ｄｒ）、ＴＳ（Ｐａ）を決定する。すなわち、日射センサ信号ＴＳ'（Ｄｒ）、ＴＳ'（Ｐａ）および下記の数１の式および数２の式に基づいて、車室内の日射強度ＴＳ（Ｄｒ）、ＴＳ（Ｐａ）および時定数Ｔ１を演算する（ステップＳ３）。

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【００４２】

【数１】

$$TS(Dr) = \{TS'(Dr) + (T1/T)\,TSn\text{-}1(Dr)\} / (T1+T)$$

【数２】

$$TS(Pa) = \{TS'(Pa) + (T1/T)\,TSn\text{-}1(Pa)\} / (T1+T)$$

【００４３】但し、Ｔは制御周期（例えば１秒間～４秒間）で、ＴＳｎ-1（Ｄｒ）はＴＳ（Ｄｒ）の１周期前の値で、ＴＳｎ-1（Ｐａ）はＴＳ（Ｐａ）の１周期前の値である。また、Ｔ１はブロワ４のブロワモータ９に印加されるブロワ制御電圧ＶＡ（Ｄｒ）、ＶＡ（Ｐａ）、運転席側、助手席側吹出口切替ドア２４～２６、３４～３６および運転席側、助手席側Ａ／Ｍドア１５、１６を制御するのに必要な日射強度ＴＳ（Ｄｒ）、ＴＳ（Ｐａ）に設けられる時定数の値で、例えば３０秒間～６１秒間※である。

【００４４】次に、上記のような記憶データおよび下記の数３の式および数４の式に基づいて、運転席側の目標吹出温度ＴＡＯ（Ｄｒ）、および助手席側の目標吹出温度ＴＡＯ（Ｐａ）を演算する（目標吹出温度決定手段：ステップＳ４）。

【００４５】

【数３】

$$TAO(Dr) = KSET \cdot TSET(Dr) - KR \cdot TR - KAM \cdot TAM - KS \cdot TS(Dr) + Kd(Dr) \times \{CD(Dr) + Ka(Dr)(10-TAM)\} \times \{TSET(Dr) - TSET(Pa)\} + C$$

【数４】

$$TAO(Pa) = KSET \cdot TSET(Pa) - KR \cdot TR - KAM \cdot TAM - KS \cdot TS(Pa) + Kd(Pa) \times \{CD(Pa) + Ka(Pa)(10-TAM)\} \times \{TSET(Pa) - TSET(Dr)\} + C$$

【００４６】但し、ＴＳＥＴ（Ｄｒ）、ＴＳＥＴ（Ｐａ）は、それぞれ運転席側空調ゾーンの設定温度、助手席側空調ゾーンの設定温度を表し、ＴＲ、ＴＡＭは、それぞれ車室内温度、外気温を表す。ＫＳＥＴ、ＫＲ、ＫＡＭ、ＫＳ、Ｋｄ（Ｄｒ）およびＫｄ（Ｐａ）は、それぞれ温度設定ゲイン、車室内温度ゲイン、外気温ゲイン、日射量ゲイン、運転席側、助手席側空調ゾーンの温度差補正ゲインを表す。

【００４７】なお、Ｋａ（Ｄｒ）、Ｋａ（Ｐａ）は、それぞれ外気温ＴＡＭが運転席側空調ゾーンおよび助手席側空調ゾーンの各空調温度に及ぼす影響度合を補正するゲインを表し、ＣＤ（Ｄｒ）、ＣＤ（Ｐａ）は上記影響度合に応じた定数、Ｃは補正定数を表す。ここで、Ｋａ（Ｄｒ）、Ｋａ（Ｐａ）、ＣＤ（Ｄｒ）、ＣＤ（Ｐａ）といった値は、車両の形や大きさ、空調ユニット１の各吹出口からの吹出方向等様々なパラメータで変化する。

【００４８】次に、上記のステップＳ４で求めた運転席側、助手席側の目標吹出温度ＴＡＯ（Ｄｒ）、ＴＡＯ（Ｐａ）に基づいてブロワ風量｛全風量：ブロワ４に印加するブロワ制御電圧ＶＡ｝を演算する（ステップＳ５）。具体的には、上記のブロワ制御電圧ＶＡは、目標吹出温度ＴＡＯ（Ｄｒ）、ＴＡＯ（Ｐａ）にそれぞれ適

合したブロワ制御電圧ＶＡ（Ｄｒ）、ＶＡ（Ｐａ）を図６の特性図に基づいて求めると共に、それらのブロワ制御電圧ＶＡ（Ｄｒ）、ＶＡ（Ｐａ）を平均化処理することにより得ている。

【００４９】次に、上記のステップＳ４で求めた運転席側、助手席側の目標吹出温度ＴＡＯ（Ｄｒ）、ＴＡＯ（Ｐａ）と、図７の特性図に示した目標吹出温度に対する吹出口モード特性とに基づいて運転席側、助手席側空調ゾーンの各吹出口モードを決定する（ステップＳ６）。具体的には、吹出口モードの決定においては、上記の目標吹出温度ＴＡＯ（Ｄｒ）、ＴＡＯ（Ｐａ）が低い温度から高い温度にかけて、ＦＡＣＥモード、Ｂ／ＬモードおよびＦＯＯＴモードとなるように決定されている。また、エアコン操作パネル５１に設けられたＭＯＤＥ切替スイッチ５７を操作することにより、ＦＡＣＥモード、Ｂ／Ｌモード、ＦＯＯＴモードおよびＦ／Ｄモードのうちいずれかの吹出口モードに固定される。

【００５０】なお、上記のＦＡＣＥモードとは、空調風を乗員の上半身（頭胸部）に向けて吹き出す吹出口モードである。また、Ｂ／Ｌモードとは、空調風を乗員の上半身（頭胸部）および足元部に向けて吹き出す吹出口モードである。そして、ＦＯＯＴモードとは、空調風を乗員の足元部に向けて吹き出す吹出口モードである。さらに、Ｆ／Ｄモードとは、空調風を乗員の足元部および車両のフロントウインドウの内面に向けて吹き出す吹出口モードである。また、エアコン操作パネル５１に設けられたＤＥＦスイッチ５４を押すと、空調風をフロントウインドウガラスの内面に向けて吹き出すＤＥＦモードに固定される。

【００５１】次に、運転席側Ａ／Ｍドア１５の目標Ａ／Ｍ開度ＳＷ（Ｄｒ）（％）および助手席側Ａ／Ｍドア１６の目標Ａ／Ｍ開度ＳＷ（Ｐａ）（％）を演算する（ステップＳ７）。なお、このような目標Ａ／Ｍ開度ＳＷ（Ｄｒ）および目標Ａ／Ｍ開度ＳＷ（Ｐａ）の演算は、運転席側、助手席側の目標吹出温度ＴＡＯ（Ｄｒ）、ＴＡＯ（Ｐａ）と、エバ後温度センサ７４の検出値であるエバ後温度（ＴＥ）と、冷却水温センサ７５の検出値である冷却水温（ＴＷ）と、下記の数５の式および数６の式とに基づいて行われる。

【００５２】

【数５】

$$SW(Dr) = \{TAO(Dr) - TE\} \times 100 / (TW - TE)$$

【数６】

$$SW(Pa) = \{TAO(Pa) - TE\} \times 100 / (TW - TE)$$

【００５３】次に、図１および図１５のルーチンが起動して、窓曇りまたは霜付きの防止、あるいは窓曇りまたは霜の除去に効果のある防曇制御を行う（ステップＳ８）。次に、決定されたブロワ制御電圧ＶＡ（Ｄｒ）、ＶＡ（Ｐａ）となるようにブロワ駆動回路８に出力信号を送る。また、決定された吹出口モードとなるようにサーボモータ２８、２９、３８、３９を通電制御する。さらに、決定された目標Ａ／Ｍ開度ＳＷ（Ｄｒ）、ＳＷ（Ｐａ）となるようにサーボモータ１７、１８を通電制御する。また、コンプレッサ判定フラグがＯＮ（ＣＦＬＡＧ＝１）の場合には電磁クラッチをＯＮし、コンプレッサ判定フラグがＯＦＦ（ＣＦＬＡＧ＝０）の場合にはコンプレッサの電磁クラッチをＯＦＦする（ステップＳ９）。次に、ステップＳ１０で所定の制御周期時間（Ｔ：例えば０．１秒間～４．０秒間）が経過した後に、ステップＳ２の処理に戻る。

【００５４】次に、エアコンＥＣＵ１０による防曇制御を図８ないし図１８に基づいて説明する。ここで、図１はエアコンＥＣＵ１０による湿度センサ検出値補正制御を示したフローチャートで、図１５はエアコンＥＣＵ１０による湿度センサ検出値に基づく防曇制御を示したフローチャートである。

【００５５】先ず、図１のルーチンが起動すると、ウインドウ付近相対湿度ＲＨｗおよび飽和絶対湿度ＲＨＷを演算するために必要なウインドウ温度（フロントウインドウガラスの露点温度）を直接検出するセンサを有しないため、車室内の空調熱負荷を検出する各種のセンサの検出値に基づいて、フロントウインドウガラスの温度（ウインドウ温度）を推定（演算）する（ウインドウ温度推定手段：ステップＳ１１）。

【００５６】ここで、フロントウインドウガラスの温度の推定、つまりウインドウ温度の演算は、図８ないし図１１に示したニューロ制御を用いて演算する。このニューロ制御の入力データとしては、図１０に示したように、内気温センサ７１の検出値である内気温ＴＲ、外気温センサ７２の検出値である外気温ＴＡＭ、日射センサ７３の検出値である日射量ＴＳ、車速センサ７７の検出値である車両走行速度（車速）ＳＰＤを用いる。このニューロ制御は、図８（ａ）のウインドウ温度の演算に用いるニューラルネットワーク、および図９（ｃ）のウインドウ温度の演算に用いるニューラルネットワークは基本的には同一構成であるので、図８（ａ）のウインドウ温度の演算に用いるニューラルネットワークを例にとって説明する。

【００５７】ニューラルネットワークは、ある入力信号（図８の例では、ＳＰＤ、ＴＳ、ＴＡＭ、ＴＲ）を与えたときに、その出力が、予め設定された所望の値（教師データ）になるように、ニューラルネットワーク｛図８（ａ）｝内に設けられた入力層１０１、第１、第２の中間層１０２、１０３、出力層１０４内部の各ニューロン１０５間の結合係数（シナプス荷重）１０６を修正するという誤差逆伝播学習機能（バックプロパーゲーション

機能）を備えた階層構造のネットワークである。

【００５８】そして、教師データを変更した場合は、再び、ある入力信号に対する出力が変更後の教師データとなるように、繰り返し「学習」させることにより、結合係数（シナプス荷重）１０６を修正する。つまり、多量のデータ（教師データ）からその相関関数（結合係数１０６）を自動生成する特徴を持っている。教師データは、実験等により求めた所望の値（入力信号に対する所望の出力値）を設定する。

【００５９】階層構造のニューラルネットワーク｛図８（ａ）｝において、同一層のニューロン１０５間では結合がなく、前後の各層のニューロン１０５でのみ結合されており、そして、各層のニューロン１０５間の結合係数１０６は、それぞれの結合の重み（強さ）の程度を表すものであって、結合の重みが大きい程、前側の層のニューロン１０５の信号が振幅の大きい信号となって、後側の層のニューロン１０５に伝達される。

【００６０】なお、入出力値は、図１０に示したように、センサ信号等をそれぞれ０～１に規格化（正規化）されたものであり、実際に出力された値は、０～１から逆変換する作業が必要である。例えば内気温センサ７１により検出される内気温（ＴＲ）の実際の検出範囲は、通常、０℃～５０℃であり、この検出値を規格化（正規化）部１０７で０～１に割り当て、ニューラルネットワーク｛図８（ａ）｝の入力層１０１に入力する。出力層１０４からの出力結果も０～１の値が出力されるので、出力変換部において予め設定された変換マップによってセンサ信号等に対応する実際の値に逆変換される。

【００６１】そして、車両搭載状態では、エアコンＥＣＵ１０内の各算出部（演算部）のニューラルネットワーク｛図８（ａ）｝は、図１１に示したように、入力に対する出力を計算する。すなわち、各ニューロン１０５では、入力信号Ｏ1 ～Ｏn のそれぞれに、対応する結合係数１０６（Ｗ1 ～Ｗn ）を掛け合わせ、その値をシグモイド関数と呼ばれる関数に適用して出力を計算する。その計算結果を後続のニューロンの入力として出力する。これを繰り返すことで最終的な出力を得る。

【００６２】ところで、ニューラルネットワークの特徴として、ある入力信号を与えたときに、その出力が、予め設定された所望の値（教師データ）になるように、ニューラルネットワーク内部の各層間の結合係数（シナプス荷重）１０６を自動修正するという学習機能を備えているため、特定の入力条件での教師データを変更して、高速演算装置を用いて結合係数（シナプス荷重）１０６の自動修正を予め行っておくことにより、特定の入力条件に対応する出力を所望の値に変更することができる。しかも、特定の入力条件での出力（教師データ）の変更を行っても、他の入力条件では、所望の出力値（教師データ）が維持されるように、結合係数１０６全体の自動修正を行うから特定の入力条件での出力変更が他の入力条件における出力に影響を与えない。その結果、所望の防曇制御特性を得ることが容易に達成される。

【００６３】次に、湿度センサ７６の検出値である乗員付近相対湿度（車室内の相対湿度）ＲＨを読み込む。すなわち、図１２の特性図に示したように、乗員付近相対湿度に比例して湿度センサ７６から出力される出力電圧（Ｖ）をＡ／Ｄ変換した後にエアコンＥＣＵ１０のマイクロコンピュータに読み込み、データ処理用メモリ（ＲＡＭ）に記憶する（ステップＳ１２）。

【００６４】次に、記憶していたイグニッションスイッチのＯＮ回数（ＩＧ・ＯＮ回数）を読み込む（ステップＳ１３）。ここで、ＩＧ・ＯＮ回数は、バッテリ電圧でバックアップされたエアコンＥＣＵ１０内のデータ処理用メモリ（ＲＡＭ）に記憶されている。次に、記憶していたＤＥＦスイッチ５４の操作回数（ＤＥＦスイッチ操作回数）を読み込む（ステップＳ１４）。ここで、ＤＥＦスイッチ操作回数は、バッテリ電圧でバックアップされたエアコンＥＣＵ１０内のデータ処理用メモリ（ＲＡＭ）に記憶されている。

【００６５】次に、ＤＥＦスイッチ５４が操作されたことがないか否かを判定する（ステップＳ１５）。この判定結果がＹＥＳの場合、すなわち、今までにＤＥＦスイッチが操作されたことがない場合には、イグニッションスイッチのＯＮ回数（ＩＧ・ＯＮ回数）を更新（＋１）する（ステップＳ１６）。

【００６６】また、ステップＳ１５の判定結果がＮＯの場合には、あるいはステップＳ１６の制御処理を実施した後には、防曇制御に用いる湿度センサ７６の補正湿度値（補正後相対湿度）を下記の数７の式に基づいて演算する（ステップＳ１７）。

【数７】

補正後相対湿度＝湿度センサ７６の検出値

＋KDEF ×ＤＥＦ操作回数－KIG×ＩＧ・ＯＮ回数

ここで、KDEF ＝０．３、KIG＝０．１である。

【００６７】したがって、ＤＥＦスイッチ５４が押される程、湿度センサ７６の検出値は実際の相対湿度に比べて低い値を示している可能性があるので、防曇制御に用いる湿度センサ補正湿度値が高くなるように補正する。また、ＤＥＦスイッチ５４が押されていなければ、湿度センサ７６の検出値は実際の相対湿度に比べて高い値を示している可能性があるので、防曇制御に用いる湿度センサ補正湿度値が低くなるように補正する。これにより、誤差の大きい、安価な湿度センサ７６を防曇制御に用いた場合でも、防曇制御を低コストで、正確、且つ容易に行うことができる。

【００６８】次に、ステップＳ１７で算出した乗員側相対湿度（補正後湿度）ＲＨおよびステップＳ１１で推定されたウインドウ温度（ＴＷＧ）からウインドウ付近相対湿度（ＲＨｗ）を演算する（ステップＳ１８）。次に、ステップＳ１７で算出した乗員側相対湿度（補正後湿度）ＲＨの快適湿度を演算する。例えば下記の数８の式および図１３の特性図に基づいて、例えば２５℃相当の相対湿度（ＲＨ２５）を演算する（ステップＳ１９）。

【数８】

$$RH25 = f(TR) \times RH / 100\ (\%)$$

但し、ＲＨは湿度センサ７６の検出値（補正後湿度）で、ｆ（ＴＲ）は内気温ＴＲの関数（湿度補正係数）である。

【００６９】次に、フロントウインドウガラスの内面が曇り易いか曇り難いかを判定するための防曇判定値として、下記の数９の式および図１４の特性図に基づいて、ステップＳ１１で推定されたウインドウ温度（ＴＷＧ）から例えば２５℃相当の飽和絶対湿度（湿り湿度：ＲＨＷ２５）を演算する（ステップＳ２０）。なお、ウインドウ温度（ＴＷＧ）は、上述したように、内気温（ＴＲ）、日射量（ＴＳ）、外気温（ＴＡＭ）、車速（ＳＰＤ）の関数で表されるが、雨天時には、ウインドウ温度（ＴＷＧ）＝外気温（ＴＡＭ）となる。

【数９】

$$RHW25 = f(TWG)\ (\%)$$

但し、ｆ（ＴＷＧ）はウインドウ温度ＴＷＧの関数である。

【００７０】次に、図１５のルーチンが起動して、図１６の特性図に基づいて、２５℃相当の相対湿度（ＲＨ２５）と防曇判定値としての２５℃相当の飽和絶対湿度（ＲＨＷ２５）とを比較して、フロントウインドウガラスの内面が曇り易いか曇り難いかを判定する（ステップＳ２１）。この判定結果がＮＯの場合には、フロントウインドウガラスの内面が曇り難いと判断してコンプレッサの稼働率を下げる目的で、コンプレッサ判定フラグをＯＦＦ（ＣＦＬＡＧ＝０）する（ステップＳ２２）。その後に図１５のルーチンを抜ける。また、ステップＳ２１の判定結果がＹＥＳの場合には、フロントウインドウガラスの内面が曇り易いと判断して、コンプレッサの電磁クラッチをＯＮするコンプレッサ判定フラグをＯＮ（ＣＦＬＡＧ＝１）する（ステップＳ２３）。

＊【００７１】したがって、本実施形態では、フロントウインドウガラスの内面の曇りの防止または除去を効果的に行う防曇制御として、湿度センサ７６の検出値（補正後湿度）と防曇判定値（飽和絶対湿度）とを比較して曇り易いと判定したら、コンプレッサをＯＮしてエバポレータ４１で車室内に吹き出す空気を除湿し、この除湿されてヒータコア４２で再加熱された温風をＤｒＤＥＦ吹出口２０、ＰａＤＥＦ吹出口３０等の吹出口からフロントウインドウガラスの内面に吹き付けることで、ウインドウ温度を高めて曇りの防止または除去が成される。

【００７２】次に、本実施形態では、可変容量型コンプレッサを使用しているので、コンプレッサの吐出容量を制御する目的で、目標エバ後温度（ＴＥＯ）を演算する（ステップＳ２４）。本実施形態では、目標エバ後温度（ＴＥＯ）の演算を、図８（ｂ）または図９（ｄ）および図１１に示した目標エバ後温度を算出するためのニューロ制御で実施するようにしている。なお、詳細な説明は、ウインドウ温度を算出するためのニューロ制御と略同様なため省略する。このとき、ニューロ制御の入力データとしては、ステップＳ１８で求めたウインドウ付近相対湿度、ステップＳ４で求めた目標吹出温度（ＴＡＯ）、ステップＳ１７で求めた乗員付近相対湿度（補正後湿度）および外気温センサ７２の検出値である外気温（ＴＡＭ）等を用いる。このようなニューロ制御を用いることにより、従来の技術では困難であった相対湿度が窓曇りの限界値付近まで上昇した時に、急激にコンプレッサの稼働率を上げるという複雑な制御を容易に行うことができる。

【００７３】次に、上記のように目標エバ後温度（ＴＥＯ）を決定した後に、エバ後温度センサ７４の検出値である実際のエバ後温度（ＴＥ）と目標エバ後温度（ＴＥＯ）とが一致するように、フィードバック制御（ＰＩ制御）にてコンプレッサの目標吐出容量を決定する（ステップＳ２５）。その後に図１５のルーチンを抜ける。具体的には、コンプレッサに付設された電磁式容量制御弁の電磁ソレノイドに供給する制御電流の目標値となるソレノイド電流（制御電流：Ｉｎ）を下記の数１０の式および数１１の式に基づいて演算する。

【数１０】

$$En = TE - TEO$$

【数１１】

$$In = In\text{-}1 - Kp\{(En - En\text{-}1) + (\theta / Ti) \times En$$

（Ａ）である。

【００７４】ここで、ＴＥはエバ後温度センサ７４の検出値である実際のエバ後温度で、ＴＥＯはステップＳ２３で求めた目標エバ後温度で、Ｋｐは比例定数（例えば０．０３）で、θはサンプリング時間（例えば１秒間）で、Ｔｉは積分定数（例えば１０００）で、Ｅｎは今回の温度偏差で、Ｅｎ-1は前回の温度偏差（℃）で、Ｉｎは今回の制御電流（Ａ）で、Ｉｎ-1は前回の制御電流

【００７５】ここで、エアコン操作パネル５１上に設けたＭＯＤＥ切替スイッチ５７を押して吹出口モードをＦ／Ｄモードにマニュアル設定したり、エアコン操作パネル５１上に設けたＤＥＦスイッチ５４を押して吹出口モードをＤＥＦモードにマニュアル設定したりした場合には、強制的にコンプレッサ判定フラグをＯＮ（ＣＦＬＡ

Ｇ＝１）してコンプレッサの電磁クラッチをＯＮし、上述のように、コンプレッサの稼働率（吐出容量）を制御するようにしても良い。

【００７６】〔第１実施形態の効果〕以上のように、本実施形態のように、車室内に吹き出す空調風をエバポレータ４１を通過する際に冷却することで乗員付近相対湿度を下げ、除湿するように働く容量可変型コンプレッサの稼働率（吐出容量）を湿度センサ７６の検出値に応じて制御するようにした車両用空調装置においては、実際の乗員付近相対湿度よりも低めの値を検出してしまう湿度センサ７６の検出値を、実際の乗員付近相対湿度に近づくように、例えば図１７（ａ）の特性図に示したように、今までに乗員がＤＥＦスイッチ５４を押した回数（ＤＥＦ操作回数）が多い程、湿度センサ検出値（補正後湿度）が高くなるように補正することで、その補正後湿度と絶対湿度との比較結果に応じて、コンプレッサの稼働率を制御することにより、誤差の大きい低コストな湿度センサ７６を用いた場合でも精度の高い防曇性能を得ることができる。

【００７７】また、実際の乗員付近相対湿度よりも高めの値を検出してしまう湿度センサ７６の検出値を、実際の乗員付近相対湿度に近づくように、例えば図１７（ｂ）の特性図に示したように、今までに乗員がイグニッションスイッチをＯＮした回数（ＩＧ・ＯＮ回数）が多い程、湿度センサ検出値（補正後湿度）が低くなるように補正することで、その補正後湿度と絶対湿度との比較結果に応じて、コンプレッサの稼働率または吐出容量を制御することにより、誤差の大きい、安価な湿度センサ７６を用いた場合も高い防曇性能を得ることができる比較的に低コストな車両用空調装置を提供できる。

【００７８】したがって、誤差の大きい湿度センサ７６を用いた場合でも、過去の乗員の操作を学習することで湿度センサ７６の検出値を補正した補正後湿度を防曇制御の湿度値として用いることにより、フロントウインドウガラスの内面が曇り易いか否かを正確に判定して防曇制御を行うことで、高い防曇性能を得ることができる。また、フロントウインドウガラスの内面の曇り難さを正確に判定して無駄にコンプレッサを起動されることを防止することで、コンプレッサの稼働率または吐出容量を低減できる。これにより、コンプレッサを駆動するエンジンの負荷が低減されるので、低燃費となる。

【００７９】なお、飽和絶対湿度ＲＨＷを演算するため＊に必要なウインドウ温度（フロントウインドウガラスの露点温度）も、例えば図１８の特性図に示したように、今までに乗員がＤＥＦスイッチ５４を押した回数（ＤＥＦ操作回数）が多い程、ウインドウ温度が低くなるように補正するようにしても良い。また、防曇制御として、フロントウインドウガラスの内面が曇る可能性があると判定されたら、コンプレッサをＯＮすることなく、吹出口モードをＦＯＯＴモードからＦ／Ｄモードまたはモードに変更するようにしても良く、あるいはそれまでよりもフロントウインドウガラスの内面に吹き付ける空調風の吹出温度を上げるようにしても良い。

【００８０】〔第２実施形態〕図１９ないし図２１は本発明の第２実施形態を示したもので、図１９（ａ）～（ｃ）および図２０はウインドウ温度のファジィ制御に用いるメンバーシップ関数を示した図で、図２１（ａ）～（ｅ）はウインドウ温度のファジィ制御に用いるファジィルールを示した図である。但し、図２０のｆ（車速）は車速の関数である。

【００８１】本実施形態では、ウインドウ温度を推定するウインドウ温度推定手段の演算方法としてファジィ制御を用いている。このファジィ制御の入力データとしては、内気温センサ７１の検出値である内気温（室温）ＴＲ、日射量センサ７３の検出値である日射量（日射強度）ＴＳ、車速センサ７７の検出値である車速（走行速度）ＳＰＤを用いている。

【００８２】例えば内気温が２５℃、日射量が５００Ｗ／m^2、外気温が－１０℃、車速が５０ｋｍ／ｈの時のウインドウ温度の推定値（演算値）は、以下のとおりである。この場合には、図１９（ａ）に示したメンバーシップ関数より「暖かい」の内気温のウインドウ温度適合度は１．０、図１９（ｂ）に示したメンバーシップ関数より「強い」の日射量のウインドウ温度適合度は１．０、図２０に示したメンバーシップ関数よりｆ（車速）は０．７５で、図１９（ｃ）に示したメンバーシップ関数より「冷たい」の外気温×ｆ（車速）のウインドウ温度適合度は０．５、「やや冷たい」の外気温×ｆ（車速）のウインドウ温度適合度は０．５である。そして、図１９および図２０のメンバーシップ関数と図２１（ａ）～（ｅ）のファジィルールとから、下記の数１２の式のようにウインドウ温度が演算（代数積加算重心法）できる。

【数１２】

$$(1.0\times1.0\times0.5\times13+1.0\times1.0\times0.5\times18)$$
$$/(1.0\times1.0\times0.5+1.0\times1.0\times0.5)\fallingdotseq15.5\ (℃)$$

【００８３】例えば内気温が１５℃、日射量が０Ｗ／m^2、外気温が－５℃、車速が２０ｋｍ／ｈの時のウインドウ温度の推定値（演算値）は、以下のとおりである。この場合には、図１９（ａ）に示したメンバーシップ関数より「やや暖かい」の内気温のウインドウ温度適合度は１．０、図１９（ｂ）に示したメンバーシップ関数より「弱い」の日射量のウインドウ温度適合度は１．０、図２０に示したメンバーシップ関数よりｆ（車速）は０．５で、図１９（ｃ）に示したメンバーシップ関数より「やや冷たい」の外気温×ｆ（車速）のウインドウ温

度適合度は０．５、「やや暖かい」の外気温×ｆ（車速）のウインドウ温度適合度は０．５である。そして、図１９および図２０のメンバーシップ関数と図２１（ａ）～（ｅ）のファジィルールとから、下記の数１３＊＊の式のようにウインドウ温度が演算（代数積加算重心法）できる。

【数１３】

$$(1.0\times1.0\times0.5\times7+1.0\times1.0\times0.5\times11)$$
$$/(1.0\times1.0\times0.5+1.0\times1.0\times0.5)\fallingdotseq9.0\ (℃)$$

【００８４】〔第３実施形態〕図２２および図２３は本発明の第３実施形態を示したもので、図２２（ａ）～（ｃ）は目標エバ後温度のファジィ制御に用いるメンバーシップ関数を示した図で、図２３（ａ）～（ｅ）は目標エバ後温度のファジィ制御に用いるファジィルールを示した図である。

【００８５】本実施形態では、目標エバ後温度（ＴＥＯ）の算出を目標エバ後温度のファジィ制御で行うようにしている。この目標エバ後温度のファジィ制御の入力データとしては、乗員付近相対湿度－ウインドウ付近相対湿度、目標吹出温度（ＴＡＯ）および外気温センサ７２の検出値である外気温（ＴＡＭ）等を用いている。なお、ファジィ制御の説明は第２実施形態と略同様のために説明を省略する。これにより、従来の技術では困難であった乗員付近相対湿度が窓曇りの限界付近まで上昇した時に、急激にコンプレッサの稼働率を上げるという複雑な制御を容易に行うことができる。

【００８６】〔第４実施形態〕図２４および図２５は本発明の第４実施形態を示したもので、図２４はエアコンＥＣＵによる湿度センサ検出値に基づく吹出口モード制御を示したフローチャートで、図２５は補正後湿度に対する吹出口モード制御特性を示した特性図である。

【００８７】本実施形態では、図５のステップＳ６において吹出口モード決定制御に入ると、図２４のルーチンが起動されて、先ず、ＡＵＴＯであるか否かを判定する（ステップＳ３１）。この判定結果がＮＯの場合には、ＭＯＤＥ切替スイッチ５７を操作することにより設定されたＦＡＣＥモード、Ｂ／Ｌモード、ＦＯＯＴモードまたはＦ／Ｄモードに吹出口モードを設定するか、あるいはＤＥＦスイッチ５４を押すことで設定されたＤＥＦモードに吹出口モードを設定する（ステップＳ３２）。その後に、図２４のルーチンを抜けて、図５のステップＳ７以降の制御処理を実行する。

【００８８】また、ステップＳ３１の判定結果がＹＥＳの場合には、図５のステップＳ４で求められた目標吹出温度ＴＡＯ（Ｄｒ）、ＴＡＯ（Ｐａ）と、図９の特性図に示した目標吹出温度に対する吹出口モード特性とに基づいて運転席側空調ゾーンおよび助手席側空調ゾーンの各吹出口モードを決定する（ステップＳ３３）。次に、ステップＳ３３で決定した吹出口モードがＦＯＯＴモードであるか否かを判定する（ステップＳ３４）。この判定結果がＮＯの場合には、吹出口モードをＦＡＣＥモードまたはＢ／Ｌモードに設定する（ステップＳ３５）。その後に、図２４のルーチンを抜けて、図５のステップＳ７以降の制御処理を実行する。

【００８９】また、ステップＳ３４の判定結果がＹＥＳの場合には、湿度センサ７６の検出値である乗員付近相対湿度（第１実施形態で求められた補正後湿度）と内気温センサ７１の検出値である内気温とから車室内の絶対湿度Ｈｒを演算する（ステップＳ３６）。次に、第１実施形態で推定されたウインドウ温度（ＴＷＧ）から飽和絶対湿度Ｈｗを演算する（ステップＳ３７）。

【００９０】次に、車室内の絶対湿度Ｈｒと防曇判定値としての飽和絶対湿度Ｈｗとを比較して、フロントウインドウガラスの内面が曇り易いか否かを判定する（ステップＳ３８）。この判定結果がＹＥＳの場合、つまりＨｒ－Ｈｗ≧αの場合には、フロントウインドウガラスの内面が曇り易いと判断できるため、図２５の特性図に示したように、吹出口モードをＦ／Ｄモードに設定する（ステップＳ３９）。その後に、図２４のルーチンを抜けて、図５のステップＳ７以降の制御処理を実行する。このとき、コンプレッサ判定フラグをＯＮ（ＣＦＬＡＧ＝１）しても良く、外気導入量を多くしても良い。

【００９１】また、ステップＳ３８の判定結果がＮＯの場合、つまりＨｒ－Ｈｗ＜αの場合には、フロントウインドウガラスの内面が曇り難いと判断できるため、図２５の特性図に示したように、吹出口モードをＦＯＯＴモードに設定する（ステップＳ４０）。その後に、図２４のルーチンを抜けて、図５のステップＳ７以降の制御処理を実行する。このとき、コンプレッサ判定フラグをＯＦＦ（ＣＦＬＡＧ＝Ｏ）しても、ＯＮ（ＣＦＬＡＧ＝１）してもどちらでも良い。また、外気導入量を少なくしても良い。

【００９２】〔第５実施形態〕図２６ないし図２８は本発明の第５実施形態を示したもので、図２６はエアコンＥＣＵによる湿度センサ検出値に基づく防曇制御を示したフローチャートで、図２７は目標吹出温度に対する湿度補正係数特性を示した図で、図２８は目標吹出温度に対する目標エバ後温度特性を示した図である。

【００９３】本実施形態では、車室内の空調熱負荷を検出する各種のセンサ（例えば内気温センサ７１、外気温センサ７２、日射センサ７３の検出値および室温設定器（例えば運転席側温度設定スイッチ６２、助手席側温度設定スイッチ６３等）の設定温度に基づいて目標吹出温度ＴＡＯを演算（決定）する（ステップＳ４１）。次に、図１のステップＳ１１～Ｓ１７の制御処理や演算処

理を行うことで、湿度センサ７６の検出値（補正後湿度）を算出する（ステップＳ４２）。

【００９４】ステップＳ４１で求めた目標吹出温度ＴＡＯに対し、ステップＳ４２で求めた湿度センサ７６の検出値（補正後湿度）および内気温センサ７１の検出値である内気温（ＴＲ）に基づいて湿度補正を行う。具体的には、ステップＳ４１では、図２７の特性図から、下記の数１４の式によって２５℃相当の相対湿度（ＲＨ２５）を演算し、このＲＨ２５に基づき、次の数１５の式＊によって湿度補正値ｆ（ＲＨ２５）を演算（決定）する（ステップＳ４３）。

【数１４】

$$RH25 = f(TR) \times RH / 60$$

但し、ＲＨは湿度センサ７６の検出値（補正後湿度）で、ｆ（ＴＲ）は内気温ＴＲの関数（湿度補正値）である。

【数１５】

$$f(RH25) = (RH25 - 60) \times 0.15$$

但し、ＲＨは湿度センサ７６の検出値（補正後湿度）で、ＴＲは内気温センサ７１の検出値で、ＲＨ２５≦３０の時、ＲＨ２５＝３０とし、ＲＨ２５≧９０の時、ＲＨ２５＝９０とする。

【００９５】次に、ステップＳ４１で求めた目標吹出温度ＴＡＯおよびステップＳ４２で求めた湿度補正値ｆ（ＲＨ２５）に基づいて、下記の数１６の式によってエバポレータ４１から吹き出す空調風の目標エバ吹出温度（目標エバ後温度：ＴＥＯ）を演算（決定）する（ステップＳ４４）。

【数１６】

$$TEO = f(TAO) - f(RH25)$$

但し、ｆ（ＴＡＯ）は図２８の特性図から求まる。

【００９６】次に、エバ後温度センサ７４の検出値である実際のエバ後温度（ＴＥ）と目標エバ後温度（ＴＥＯ）とが一致するように、フィードバック制御（ＰＩ制御）にてコンプレッサの目標吐出容量を決定する（ステップＳ４５）。その後に図２６のルーチンを抜ける。

【００９７】〔他の実施形態〕第１実施形態では、ＤＥＦスイッチ操作回数またはＩＧ・ＯＮ回数または制御変更要求に応じて、防曇制御に用いる湿度センサ７６等のセンサの検出値を補正するようにしたが、電熱線等の加熱手段を用いてフロントウインドウガラスを暖め、窓曇りを晴らすスイッチの操作回数に応じて、防曇制御に用いる湿度センサ７６等のセンサの検出値を補正するようにしても良い。

【００９８】第１実施形態では、フロントウインドウガラスの内面の曇り（窓曇り）易さを推定する手段として湿度センサ７６を用いたが、フロントウインドウガラスの内面の曇り（窓曇り）易さを推定する手段としてフロントウインドウの結露またはフロントウインドウ透過度またはフロントウインドウ温度を検出するセンサを用いても良い。

【００９９】第１実施形態では、過去の乗員の操作または制御変更要求または空調作動時間に応じて乗員付近相対湿度またはウインドウ温度を補正するようにしたが、他の窓曇り除去または防止に効果のある手段、例えば相対湿度を下げることができるコンプレッサ制御の制御特性、またはＤｒ、ＰａＤＥＦ吹出口２０、３０からの空調風の吹出風量を制御するＤＥＦ風量制御の制御特性、ＤＥＦ吹出温度制御の制御特性を過去の乗員の操作または制御変更要求に応じて補正するようにしても良い。この場合には、第１実施形態と同様な効果を得ることができる。

【０１００】第１実施形態では、補正量を線形式で求めたが、人間工学的に、誰でも１～２回はＤＥＦスイッチ５４を操作してみるとか、必ず操作する人がいるとかなど、防曇制御に反映すると都合が悪い操作を除外するために、ニューロ制御またはファジィ制御を用いてＤＥＦ操作傾向を推定することでセンサ検出値の補正精度を向上させるようにしても良い。

【０１０１】第１実施形態では、ＤＥＦ操作回数またはＩＧ・ＯＮ回数（エンジンの始動回数）等の乗員の操作の防曇制御への反映を即時行っていたが、所定時間（例えば５秒間）が経過した後に乗員の操作を防曇制御に反映させるようにすることで、誤操作による不具合を防止することもできる。また、湿度センサ検出値または防曇制御の制御特性が補正されていることを乗員に知らせる視覚表示手段（例えばディスプレイ５２やウォーニングランプ等）や聴覚表示手段（ブザーや音声等）を設けることで、ユーザーに合った防曇制御になっていくことを実感できると共に、メーカーが後で回収した時に最初のチューニングとのズレ量を確認することができる。これにより、そのズレ量を設計資料にできることで、付加価値が高まる。

【０１０２】第１実施形態では、単にＤＥＦ操作回数で湿度センサ７６の検出値を補正してコンプレッサの稼働率を制御する防曇制御を実施したが、より正確に防曇制御を実施するためには、湿度センサ７６の検出値の誤差とウインドウ温度の推定値の誤差とを分離してそれぞれに対して補正を行うようにした方が良い。ここで、フロントウインドウガラスの温度（ウインドウ温度）は、雨天時にウインドウガラスが雨に濡れると、外気温とほぼ等しくなることが実験によって分かっている。そのために、雨天であることが推定または検出できれば、ウインドウ温度は外気温センサ７２の検出値である外気温（ＴＡＭ）を用いることで、殆ど誤差が生じない。

【０１０３】したがって、雨天時にＤＥＦスイッチ５４

が操作されたということは湿度センサ７６が実際の相対湿度よりも低めに検出していることになる。この場合には、湿度センサ７６の検出値を補正すれば正確な防曇制御を行えることが分かる。そのために、空調作動時間の経過と共に湿度センサ７６の検出値を高めに補正している制御も、雨天と判断した回数が多くなる程、湿度センサ７６の検出値を高めに補正していくことで、より正確に最適な湿度センサ補正量を得ることができる。例えば雨天時を２０回検出した場合に、湿度センサの検出値の補正が充分に行われたと判断し、ウインドウ温度検出（推定）手段の誤差の補正に入ることが望ましい。

【０１０４】また、ウインドウ温度を空調作動時間の経過と共に、例えばＩＧ・ＯＮ回数と共に上げていき乗員がＤＥＦスイッチ５４を押すまで上げていく。乗員がＤＥＦスイッチ５４を押せばウインドウ推定温度を低く補正するが、ウインドウ温度は内気温、外気温、車速、日射量といった多くのパラメータにより推定される。そのために、ウインドウ温度を低く補正するといっても、どのパラメータの寄与率が間違っているのか判定が困難である。

【０１０５】したがって、各パラメータがどの値の時に、ウインドウ推定温度が間違っていたか否かをプロットすることが可能なニューロ制御またはファジィ制御を用いることで、容易にウインドウ温度の補正が可能となる。このような学習制御を用いたウインドウ温度補正以外にも、車両発売時のウインドウ温度推定を可能な限り最適にしておくための車両チューニング段階でも、ニューロ制御またはファジィ制御を用いて、プロットによりチューニングすることで複雑なウインドウ温度の推定を容易に実施することができる。

【０１０６】本実施形態では、湿度センサ７６をインストルメントパネル５０の前面の凹所内に内気温センサ７１と共に収容して乗員側相対湿度を検出し、ウインドウ温度と乗員付近相対湿度（補正後湿度）とからウインドウ付近相対湿度を算出しているが、乗員側相対湿度を湿度センサ７６によって検出し、ウインドウ付近相対湿度をフロントウインドウ付近に追加設置した湿度センサによって検出するようにしても良い。

【０１０７】本実施形態では、圧縮機として電磁式容量可変弁を有する可変容量型コンプレッサを用いた例を説明したが、圧縮機として電磁クラッチでＯＮ／ＯＦＦされるコンプレッサ、あるいはモータにより駆動される電動式のコンプレッサを用いても良い。また、ＦＡＣＥ吹出口とＦＯＯＴ吹出口の両方を１つの吹出口モード切替ドアによって開閉しても良い。さらに、ヒータコア４２の代わりに、冷凍サイクルのコンデンサ（加熱用熱交換器）を設置しても良い。

【図面の簡単な説明】

【図１】エアコンＥＣＵによる湿度センサ検出値補正制御を示したフローチャートである（第１実施形態）。

【図２】空調ユニットの全体構成を示した模式図である（第１実施形態）。

【図３】車両のインストルメントパネルを示した正面図である（第１実施形態）。

【図４】エアコン操作パネルを示した正面図である（第１実施形態）。

【図５】エアコンＥＣＵの制御プログラムの一例を示したフローチャートである（第１実施形態）。

【図６】目標吹出温度に対するブロワ制御電圧特性を示した特性図である（第１実施形態）。

【図７】目標吹出温度に対する吹出口モード制御特性を示した特性図である（第１実施形態）。

【図８】（ａ）はウインドウ温度の演算に用いるニューラルネットワークを示した図で、（ｂ）は目標エバ後温度の演算に用いるニューラルネットワークを示した図である（第１実施形態）。

【図９】（ｃ）はウインドウ温度の演算に用いるニューラルネットワークを示した図で、（ｄ）は目標エバ後温度の演算に用いるニューラルネットワークを示した図である（第１実施形態）。

【図１０】ニューラル制御またはファジィ制御の入出力データを示した図である（第１実施形態）。

【図１１】ニューラルネットワークに用いるシグモイド関数を示した図である（第１実施形態）。

【図１２】乗員付近相対湿度に対する湿度センサ出力電圧特性を示した特性図である（第１実施形態）。

【図１３】内気温に対する湿度補正係数を示した特性図である（第１実施形態）。

【図１４】ウインドウ温度に対するｆ（ＴＷＧ）を示した特性図である（第１実施形態）。

【図１５】エアコンＥＣＵによる湿度センサ検出値に基づく防曇制御を示したフローチャートである（第１実施形態）。

【図１６】ＲＨ２５－ＲＨＷ２５（％）に対する防曇判定特性を示した特性図である（第１実施形態）。

【図１７】（ａ）はＤＥＦ操作回数に対する湿度補正量特性を示した特性図で、（ｂ）はＩＧ・ＯＮ回数に対する湿度補正量特性を示した特性図である（第１実施形態）。

【図１８】ＤＥＦ操作回数に対するウインドウ温度補正量特性を示した特性図である（第１実施形態）。

【図１９】（ａ）～（ｃ）はウインドウ温度のファジィ制御に用いるメンバーシップ関数を示した図である（第２実施形態）。

【図２０】ウインドウ温度のファジィ制御に用いるメンバーシップ関数を示した図である（第２実施形態）。

【図２１】（ａ）～（ｅ）はウインドウ温度のファジィ制御に用いるファジィルールを示した図である（第２実施形態）。

【図２２】（ａ）～（ｃ）は目標エバ後温度のファジィ

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制御に用いるメンバーシップ関数を示した図である（第３実施形態）。

【図２３】（ａ）～（ｅ）は目標エバ後温度のファジィ制御に用いるファジィルールを示した図である（第３実施形態）。

【図２４】エアコンＥＣＵによる湿度センサ検出値に基づく吹出口モード制御を示したフローチャートである（第４実施形態）。

【図２５】補正後湿度に対する吹出口モード制御特性を示した特性図である（第４実施形態）。

【図２６】エアコンＥＣＵによる湿度センサ検出値に基づく防曇制御を示したフローチャートである（第５実施形態）。

【図２７】目標吹出温度に対する湿度補正係数特性を示した特性図である（第５実施形態）。

【図２８】目標吹出温度に対する目標エバ後温度特性を示した特性図である（第５実施形態）。

【符号の説明】

１　空調ユニット

34

＊１０　エアコンＥＣＵ（記憶手段、ウインドウ温度検出手段、ウインドウ温度推定手段、防曇制御手段）

２０　ＤｒＤＥＦ吹出口

２４　運転席側吹出口切替ドア（空調機器）

２８　サーボモータ（アクチュエータ）

３０　ＰａＤＥＦ吹出口

３４　助手席側吹出口切替ドア（空調機器）

３８　サーボモータ（アクチュエータ）

４１　エバポレータ（空調機器、熱交換器）

５１　エアコン操作パネル

５４　ＤＥＦスイッチ

５７　吹出口モード切替スイッチ

７１　内気温センサ

７２　外気温センサ

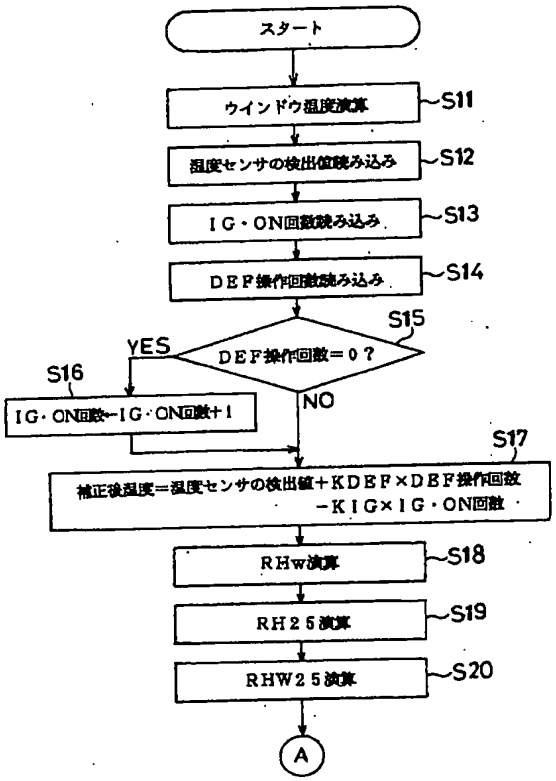
７３　日射センサ

７４　エバ後温度センサ

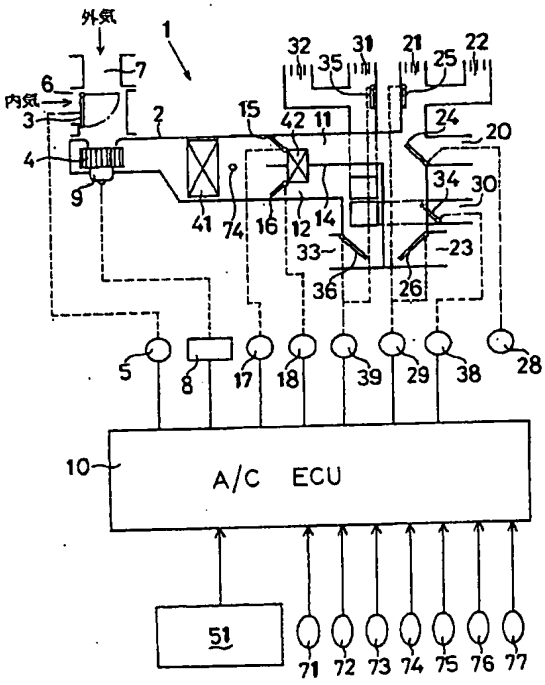
７６　湿度センサ（湿度検出手段）

７７　車速センサ

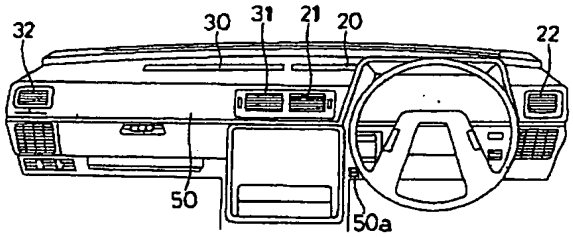
【図１】



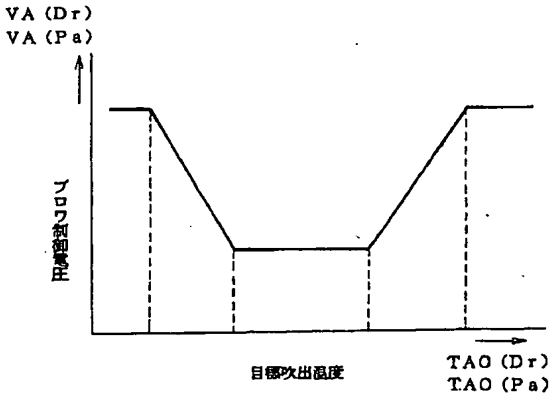
【図２】



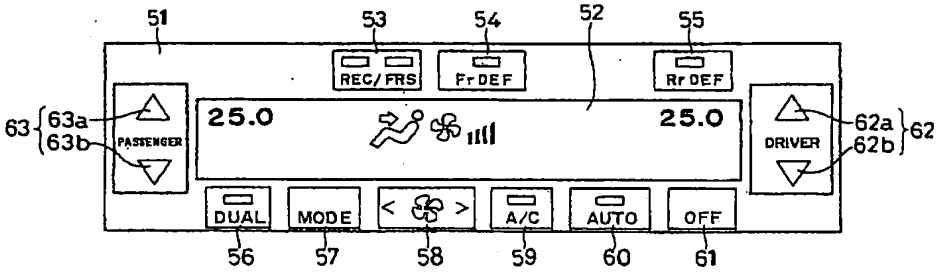
【図３】


32
30
31
21
20
22
50
50a

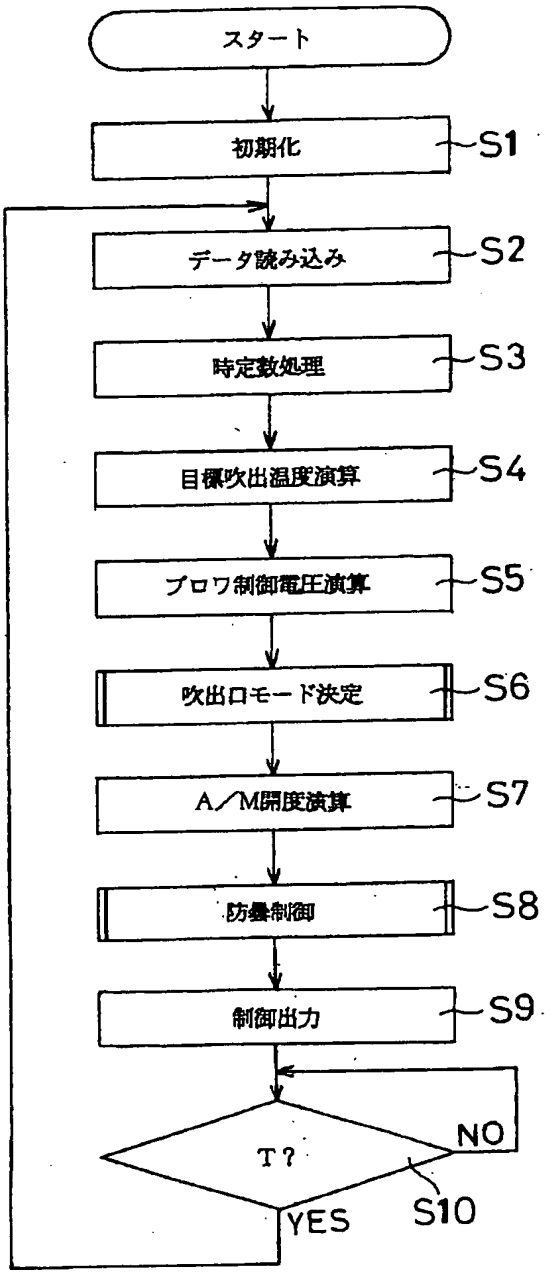
【図６】


VA (Dr)
VA (Pa)
ブロワ制御電圧
目標吹出温度
TAO (Dr)
TAO (Pa)

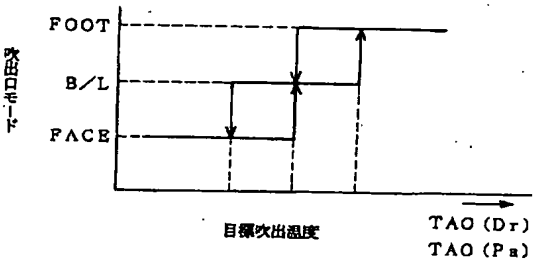
【図４】


51
53
54
52
55
REC/FRS
FrDEF
RrDEF
63
63a
63b
PASSENGER
25.0
25.0
DRIVER
62a
62b
62
DUAL
MODE
A/C
AUTO
OFF
56
57
58
59
60
61

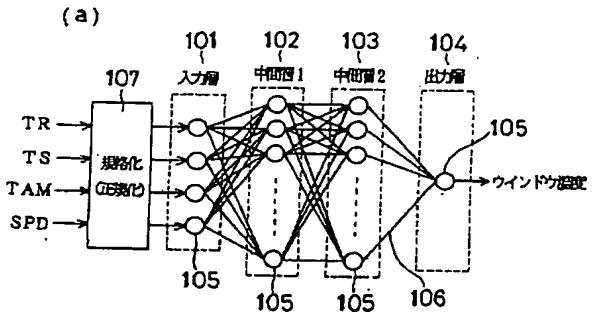
【図５】


スタート
初期化
S1
データ読み込み
S2
時定数処理
S3
目標吹出温度演算
S4
ブロワ制御電圧演算
S5
吹出口モード決定
S6
A／M開度演算
S7
防曇制御
S8
制御出力
S9
T？
NO
YES
S10

【図７】

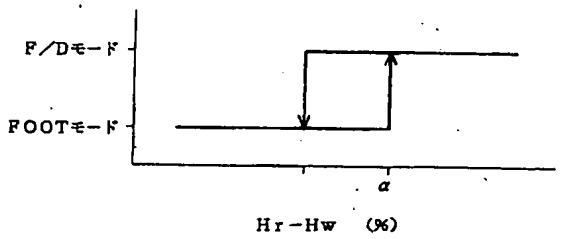

吹出口モード
FOOT
B／L
FACE
目標吹出温度
TAO (Dr)
TAO (Pa)

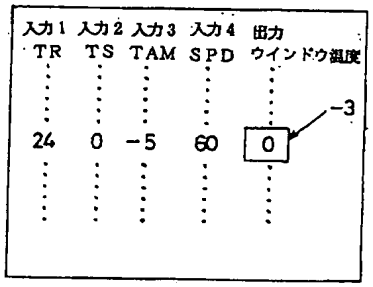
【図８】


(a)
101
入力層
102
中間層1
103
中間層2
104
出力層
107
TR
TS
TAM
SPD
規格化
(正規化)
105
ウインドウ温度
106
(b)
入力層
中間層1
中間層2
出力層
ウインドウ付近相対湿度
目標吹出温度
乗員付近相対湿度
TAM
規格化
(正規化)
目標エバ後温度

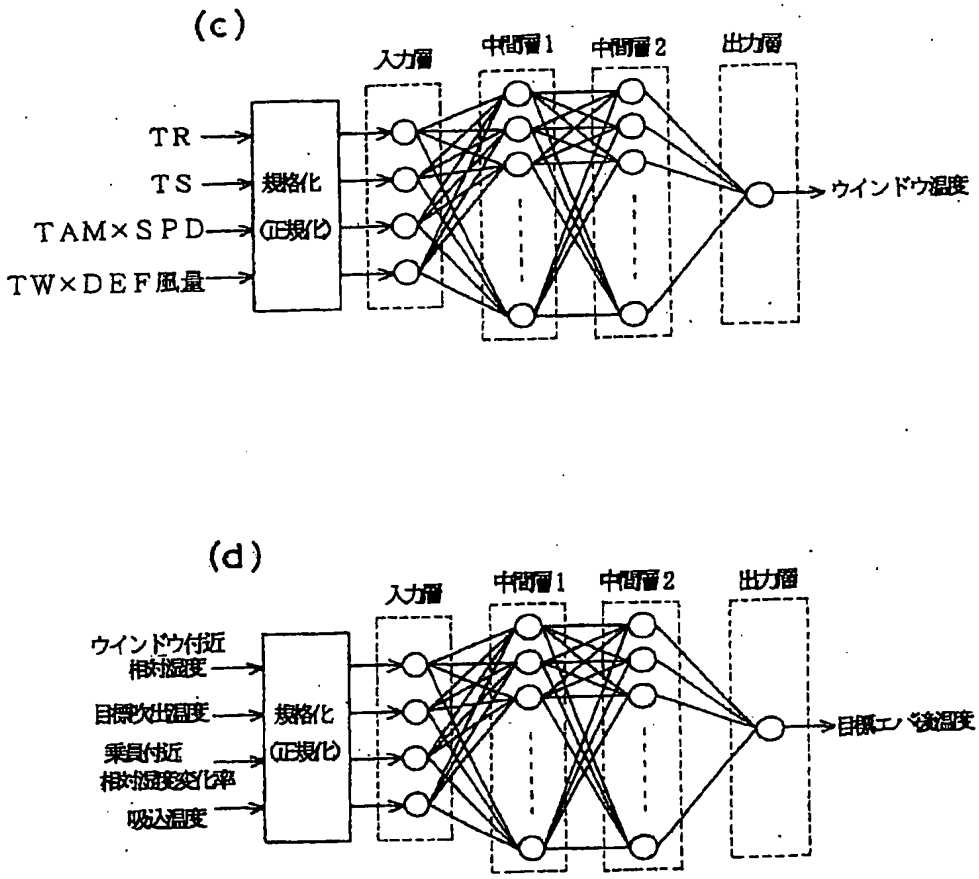
【図１０】

【図２５】

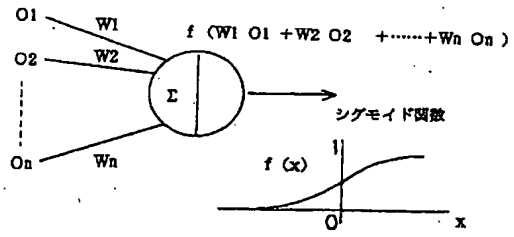

F／Dモード
FOOTモード
a
Hr－Hw　(%)


入力1
TR
入力2
TS
入力3
TAM
入力4
SPD
出力
ウインドウ温度
24
0
−5
60
0
−3

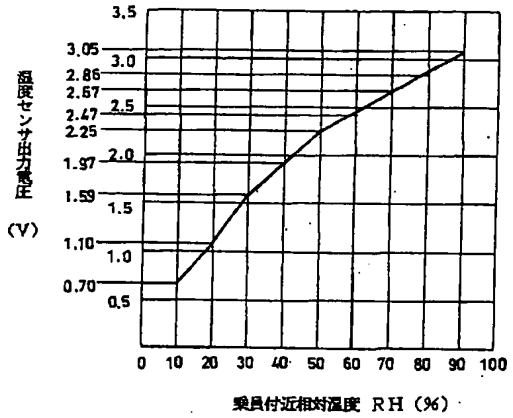
【図９】


(c)
入力層
中間層1
中間層2
出力層
TR
TS
TAM×SPD
TW×DEF風量
規格化
(正規化)
ウインドウ温度
(d)
入力層
中間層1
中間層2
出力層
ウインドウ付近
相対湿度
目標吹出温度
乗員付近
相対湿度変化率
吸込温度
規格化
(正規化)
目標エバ後温度

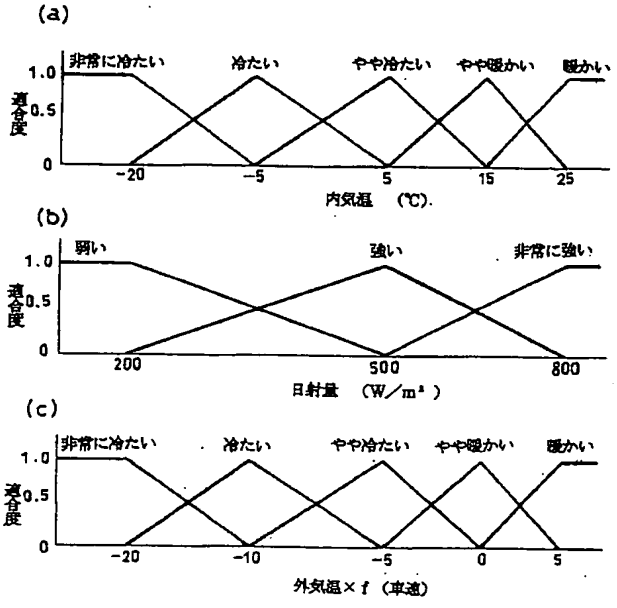
【図１１】


O1
W1
O2
W2
On
Wn
Σ
f (W1 O1 +W2 O2 +……+Wn On)
シグモイド関数
f (x)
1
0
x

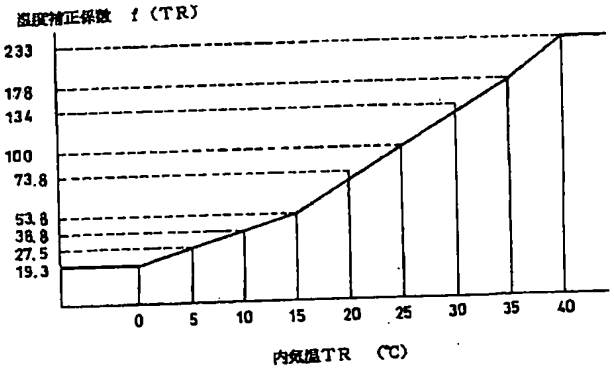
【図１２】


温度センサ出力電圧 (V)
3.5
3.05
3.0
2.86
2.67
2.5
2.47
2.25
2.0
1.97
1.59
1.5
1.10
1.0
0.70
0.5
0 10 20 30 40 50 60 70 80 90 100
乗員付近相対温度 RH (%)

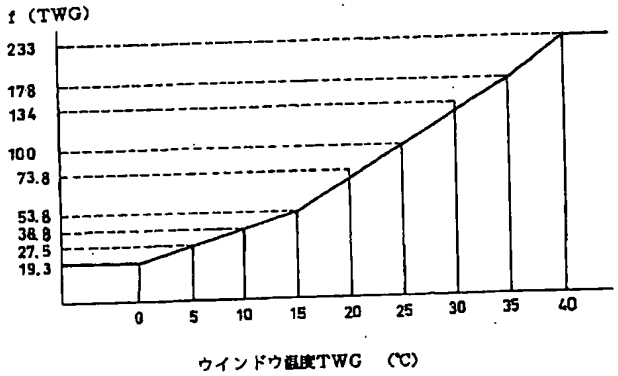
【図１９】


(a)
非常に冷たい
冷たい
やや冷たい
やや暖かい
暖かい
適合度
1.0
0.5
0
-20
-5
5
15
25
内気温 (℃)
(b)
弱い
強い
非常に強い
適合度
1.0
0.5
0
200
500
800
日射量 (W/m²)
(c)
非常に冷たい
冷たい
やや冷たい
やや暖かい
暖かい
適合度
1.0
0.5
0
-20
-10
-5
0
5
外気温×f (車速)

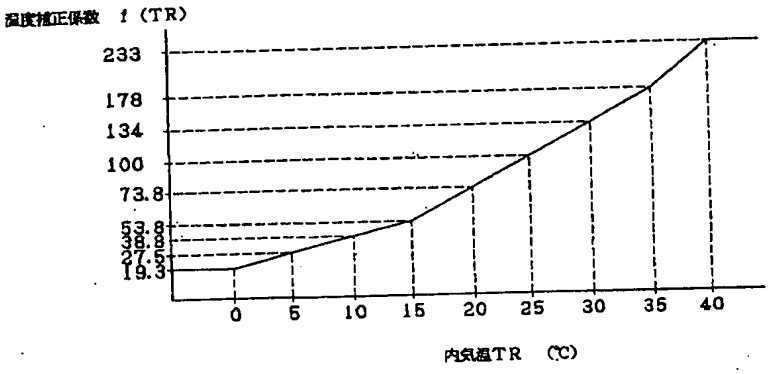
【図１３】


温度補正係数　f（TR）
233
178
134
100
73.8
53.8
38.8
27.5
19.3
0
5
10
15
20
25
30
35
40
内気温TR　(℃)

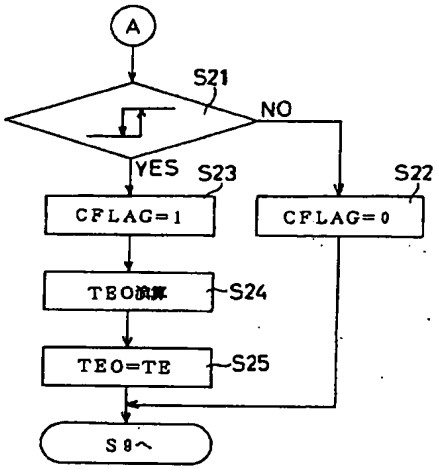
【図１４】


f（TWG）
233
178
134
100
73.8
53.8
38.8
27.5
19.3
0
5
10
15
20
25
30
35
40
ウインドウ温度TWG　(℃)

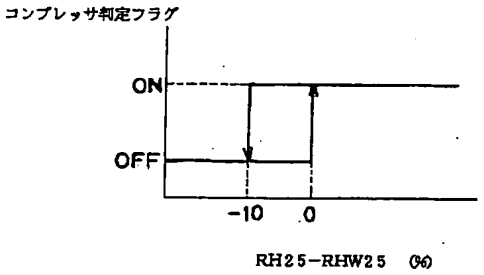
【図２７】


温度補正係数　f（TR）
233
178
134
100
73.8
53.8
38.8
27.5
19.3
0
5
10
15
20
25
30
35
40
内気温TR　(℃)

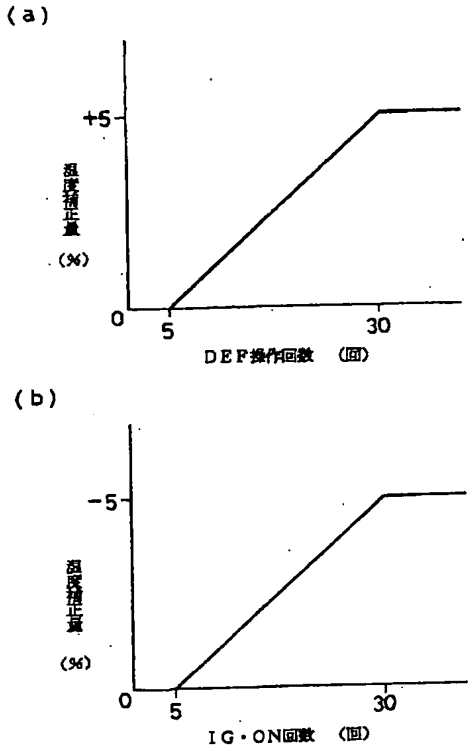
【図１５】


A
S21
NO
YES
S23
S22
CFLAG=1
CFLAG=0
TEO演算
S24
TEO=TE
S25
S8へ

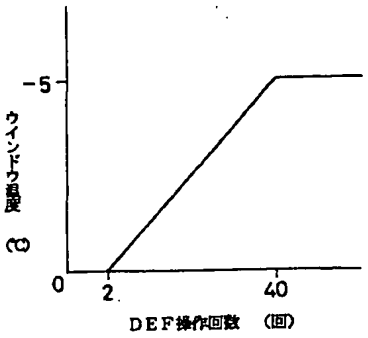
【図１６】


コンプレッサ判定フラグ
ON
OFF
-10
0
RH25−RHW25 (%)

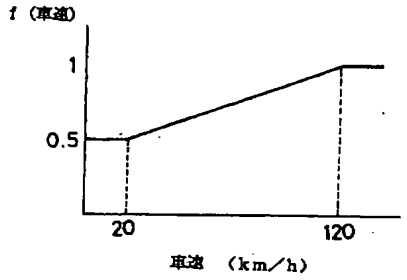
【図１７】


(a)
+5
温度補正量
(%)
0
5
30
DEF操作回数　(回)
(b)
-5
温度補正量
(%)
0
5
30
IG・ON回数　(回)

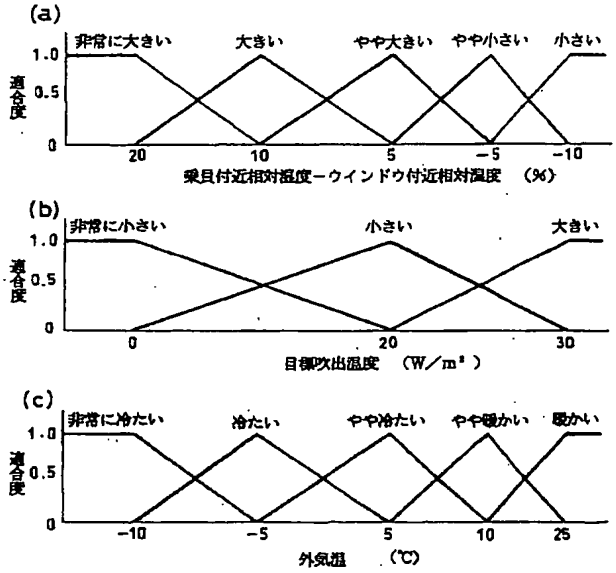
【図１８】


-5
ウインドウ温度
(℃)
0
2
40
DEF操作回数　(回)

【図２０】


f（車速）
1
0.5
20
120
車速　（km／h）

【図２２】


(a)
非常に大きい
大きい
やや大きい
やや小さい
小さい
適合度
1.0
0.5
0
20
10
5
−5
−10
乗員付近相対湿度ーウインドウ付近相対湿度　(%)
(b)
非常に小さい
小さい
大きい
適合度
1.0
0.5
0
0
20
30
目標吹出温度　(W／m²)
(c)
非常に冷たい
冷たい
やや冷たい
やや暖かい
暖かい
適合度
1.0
0.5
0
−10
−5
5
10
25
外気温　(℃)

【図２１】

(a)・室温 非常に冷たい

		日射量		
		弱い	強い	非常に強い
(外気温－20)×車速	非常に冷たい	−20	−14	−9
	冷たい	−17	−11	−6
	やや冷たい	−12	−7	−4
	やや暖かい	−10	−6	−2
	暖かい	−5	−2	1

(b)・室温 冷たい

		日射量		
		弱い	強い	非常に強い
外気温×f(車速)	非常に冷たい	−13	−7	−2
	冷たい	−9	−5	0
	やや冷たい	−5	−2	2
	やや暖かい	1	3	5
	暖かい	5	8	9

(c)・室温 やや冷たい

		日射量		
		弱い	強い	非常に強い
外気温×f(車速)	非常に冷たい	−8	−3	1
	冷たい	−3	2	6
	やや冷たい	2	6	10
	やや暖かい	7	11	14
	暖かい	12	15	19

(d)・室温 やや暖かい

		日射量		
		弱い	強い	非常に強い
外気温×f(車速)	非常に冷たい	−2	3	8
	冷たい	2	7	12
	やや冷たい	7	11	16
	やや暖かい	11	15	19
	暖かい	16	20	24

(e)・室温 暖かい

		日射量		
		弱い	強い	非常に強い
外気温×f(車速)	非常に冷たい	3	8	13
	冷たい	8	13	18
	やや冷たい	13	18	23
	やや暖かい	18	23	27
	暖かい	23	27	31

【図２３】

(a) :乗員付近相対湿度ーウインドウ付近相対湿度　非常に大きい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	−2	−2
	冷たい	−2	−2	−2
	やや冷たい	−2	−1	−1
	やや暖かい	−2	−1	−1
	暖かい	−1	−1	−1

(b)・乗員付近相対湿度ーウインドウ付近相対湿度　大きい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	−2	−2
	冷たい	−2	−2	−2
	やや冷たい	−2	−1	−1
	やや暖かい	−1	−1	−1
	暖かい	−1	0	0

(c)・乗員付近相対湿度ーウインドウ付近相対湿度　やや大きい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	−2	5
	冷たい	−2	−1	5
	やや冷たい	−1	−1	5
	やや暖かい	−1	0	5
	暖かい	0	0	5

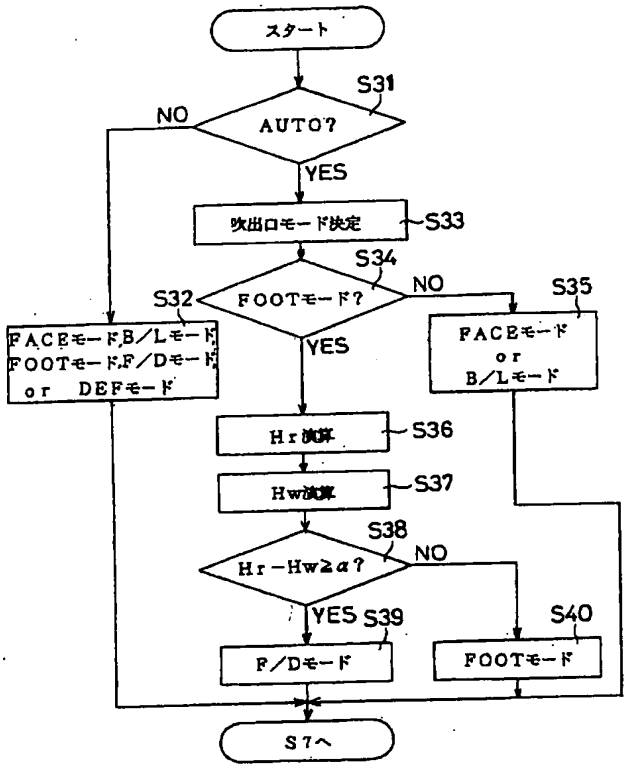
(d)・乗員付近相対湿度ーウインドウ付近相対湿度　やや小さい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	5	12
	冷たい	−2	5	12
	やや冷たい	−1	5	12
	やや暖かい	0	5	12
	暖かい	0	5	12

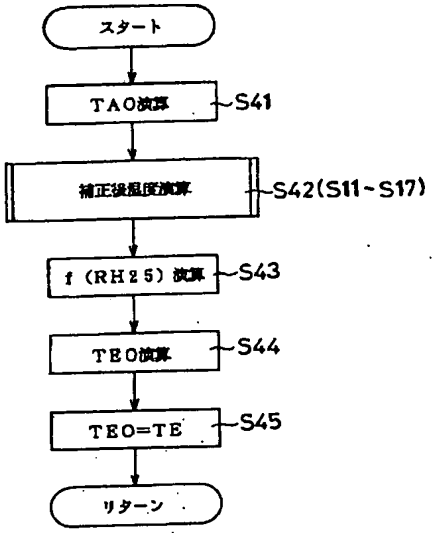
(e)・乗員付近相対湿度ーウインドウ付近相対湿度　小さい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	8	15
	冷たい	−2	8	15
	やや冷たい	−1	8	15
	やや暖かい	0	8	15
	暖かい	0	8	15

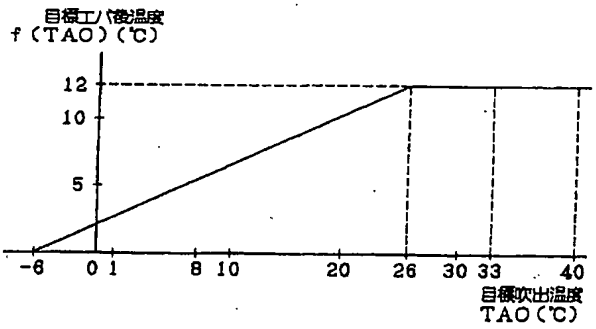
【図２４】


スタート
S31
AUTO?
NO
YES
吹出口モード決定
S33
S34
FOOTモード?
NO
S35
S32
YES
FACEモード,B/Lモード,
FOOTモード,F/Dモード,
or DEFモード
FACEモード
or
B/Lモード
Hr演算
S36
Hw演算
S37
S38
Hr-Hw≧α?
NO
YES
S39
S40
F/Dモード
FOOTモード
S7へ

【図２６】


スタート
TAO演算
S41
補正後温度演算
S42(S11~S17)
f(RH25)演算
S43
TEO演算
S44
TEO=TE
S45
リターン

【図２８】



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
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CLAIMS

[Claim(s)]
[Claim 1] (a) The actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (b) A storage means to memorize the control characteristic which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (c) The control characteristic memorized by crew's actuation, control change request, or said storage means is embraced. It has the antifog control means which controls the control state of said actuator automatically. Said antifog control means The air conditioner for cars characterized by changing the control characteristic which learns actuation of the past crew or a control change request, and has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost according to the study result.
[Claim 2] (a) The actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (b) Dew condensation, window transmittance, or window temperature detection means of humidity or a window, (c) It responds to any one or more detection values of dew condensation or the window transmittance of actuation of crew, a control change request, said humidity, or a window, or the window temperature detection means. It has the antifog control means which controls the control state of said actuator automatically. Said antifog control means The air conditioner for cars characterized by learning actuation of the past crew or a control change request, and amending any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means according to the study result.
[Claim 3] (a) The refrigerating cycle which has the heat exchanger which cools and dehumidifies the compressor which compresses a refrigerant, and the air which blows off to the vehicle interior of a room, (b) According to actuation of crew or a control change request, it has the antifog control means which controls the control state of said compressor or said heat exchanger automatically. Said antifog control means The air conditioner for cars characterized by learning actuation of the past crew or a control change request, and amending the operating ratio of said compressor or said heat exchanger, capacity, or any one or more physical values of the actuation conditions according to the study result.
[Claim 4] (a) The air-conditioning duct which has the outlet which blows off an air-conditioning wind towards a window, (b) A blow-off condition adjustable means to change any one or more physical values of the blow-off rate to the blow-off airflow or the window to a changing condition or a window to outlet Mohd including the blowdown of the air-conditioning style to a window, (c) According to actuation of crew or a control change request, it has the antifog control means which controls the control state of the aforementioned blow-off condition adjustable means automatically. Said antifog control means Learn actuation of the past crew or a control change request, and it responds to the study result. The air conditioner for cars characterized by amending any one or more physical values of the blow-off rate of the air-conditioning style to the airflow or the window of the air-conditioning style to the changing condition or window to outlet Mohd including the blowdown of the air-conditioning style to a window.

[Claim 5] (a) The air-conditioning duct which has the outlet which blows off an air-conditioning wind towards a window, (b) A blow-off condition adjustable means to change whenever [to a window / blow-off temperature / of the air-conditioning style], (c) According to actuation of crew or a control change request, it has the antifog control means which controls the control state of the aforementioned blow-off condition adjustable means automatically. Said antifog control means The air conditioner for cars characterized by learning actuation of the past crew or a control change request, and amending whenever [to a window / blow-off temperature / of the air-conditioning style] according to the study result.
[Claim 6] (a) The actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (b) A window temperature presumption means to presume window temperature, and (c) crew's actuation or control change request, Or the window temperature presumed with said window temperature presumption means is embraced. The air conditioner for cars characterized by having the antifog control means which controls the control state of said actuator automatically, and using any one or more of fuzzy control or the neuro-control for said window temperature presumption means.
[Claim 7] (a) The actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (b) A storage means to memorize the control characteristic which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (c) The control characteristic memorized by crew's actuation, control change request, or said storage means is embraced. It has the antifog control means which controls the control state of said actuator automatically. Said antifog control means The air conditioner for cars characterized by using any one or more of fuzzy control or the neuro-control for the control which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost.

[Claim 8] (a) The actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (b) The heat exchanger which cools and dehumidifies the air which blows off to the vehicle interior of a room, actuation of (c) crew, or a control change request is accepted. Compute the target temperature said heat exchanger or near [said] a heat exchanger, and the target temperature said this computed heat exchanger or near [said] a heat exchanger is embraced. It is the air conditioner for cars which is equipped with the antifog control means which controls the control state of said actuator automatically, and is characterized by said antifog control means using any one or more of fuzzy control or the neuro-control for calculation of the target temperature said heat exchanger or near [said] a heat exchanger.
[Claim 9] (a) The actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (b) A detection means to detect the physical quantity which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (c) According to the detection value of actuation of crew, a control change request, or said detection means, it has the antifog control means which controls the control state of said actuator automatically. Said antifog control means The air conditioner for cars characterized by changing the detection value of said detection means with the parameter which can presume air-conditioning operating time, and using for control.
[Claim 10] (a) The actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (b) Dew condensation, window transmittance, or window temperature detection means of humidity or a window, (c) It responds to any one or more detection values of dew condensation or the window transmittance of actuation of crew, a control change request, said humidity, or a window, or the window temperature detection means. It has the antifog control means which controls the control state of said actuator automatically. Said antifog control means The air conditioner for cars characterized by changing any one or more detection values of dew condensation or the window transmittance of said humidity or a window, or the window temperature detection means with the parameter which can presume air-conditioning operating time, and using for control.
[Claim 11] (a) The actuator of the air-conditioning equipment which performs removal of the prevention

with aperture cloudiness or frost, aperture cloudiness, or frost, (b) A window temperature presumption means to presume window temperature, and (c) crew's actuation or control change request, Or the window temperature presumed with said window temperature presumption means is embraced. The air conditioner for cars characterized by having the antifog control means which controls the control state of said actuator automatically, changing said window temperature presumption means with the parameter which can presume air-conditioning operating time, and using for control.

[Claim 12] The air conditioner for cars characterized by using any one or more of fuzzy control or the neuro-control for either in the air conditioner for cars of a publication at calculation of said amount of modification, or the amount of amendments among claim 1 thru/or claim 5.

[Claim 13] The air conditioner for cars characterized by actuation of said crew or a control change request being the prevention with aperture cloudiness or frost, aperture cloudiness, or the removal means of frost in the air conditioner for cars given in either among claim 1 thru/or claim 5.

[Claim 14] It is the air conditioner for cars characterized by being a window heating means to heat the foot differential-gear selection means or window which chooses outlet Mohd including the blowdown of the air-conditioning style to the defroster selection means or window where the prevention said aperture cloudiness or with frost, aperture cloudiness, or the removal means of frost chooses the blowdown of the air-conditioning style to a window in the air conditioner for cars according to claim 13.

[Claim 15] Reflecting actuation of said crew or a control change request in either in the air conditioner for cars of a publication among claim 1 thru/or claim 14 is an air conditioner for cars characterized by being after carrying out actuation of crew or a control change request and predetermined time passes.

[Claim 16] It is the air conditioner for cars characterized by lessening said amount of modification, or the amount of amendments [after actuation of said crew or a control change request becomes said 1st count of predetermined until actuation of said crew or a control change request reaches either in the air conditioner for cars of a publication at the 1st count of predetermined among claim 1 thru/or claim 13].

[Claim 17] It is the air conditioner for cars characterized by lessening said amount of modification, or the amount of amendments [before actuation of said crew or a control change request becomes said 2nd count of predetermined] after actuation of said crew or a control change request reaches either in the air conditioner for cars of a publication at the 2nd count of predetermined among claim 1 thru/or claim 16.

[Claim 18] The air conditioner for cars characterized by establishing the display means which displays [vision-] or displays [acoustic-sense-] said amount of modification, or the amount of amendments in the air conditioner for cars given in either among claim 1 thru/or claim 17.

[Claim 19] The air conditioner for cars characterized by preparing in either the modification means or adjustment device in which modification or adjustment is possible for said amount of modification, or the amount of amendments in the air conditioner for cars of a publication by approaches other than the prevention said aperture cloudiness or with frost, aperture cloudiness, or the removal means of frost among claim 1 thru/or claim 18.

[Claim 20] The air conditioner for cars characterized by including the coincidence input of two or more input means for said amount of modification, or the amount of amendments at least with approaches other than the prevention said aperture cloudiness or with frost, aperture cloudiness, or the removal means of frost in the air conditioner for cars according to claim 19.

[Claim 21] It is the air conditioner for cars characterized by performing said modification or amendment near the condition actuation of the crew of said past or a control change request was performed in the air conditioner for cars given in either among claim 1 thru/or claim 20.

[Claim 22] It is the air conditioner for cars characterized by lessening said amount of modification [after the parameter which can presume said air-conditioning operating time reaches the 1st predetermined value until the parameter which can presume said air-conditioning operating time reaches either in the air conditioner for cars of a publication at the 1st predetermined value among claim 9 thru/or claim 11].

[Claim 23] It is the air conditioner for cars characterized by lessening said amount of modification [after the parameter which can presume said air-conditioning operating time reaches either in the air conditioner for cars of a publication beyond the 2nd predetermined value among claim 9 thru/or claim

11, or claim 22, before the parameter which can presume said air-conditioning operating time reaches beyond the 2nd predetermined value].
[Claim 24] It sets to the air conditioner for cars given in either among claim 9 thru/or claim 11, claim 22, or claim 23. With the parameter which can presume said air-conditioning operating time Any one or more elapsed time in after a dc-battery injection, car driving means actuation, air-conditioning actuation, or ventilation actuation, Or the air conditioner for cars characterized by being any one or more counts in the count of car driving means actuation, the count of ignition-on, the count of accessory power-source ON, or the count of starter-on.
[Claim 25] The air conditioner for cars characterized by computing the conditions which perform said modification or amendment to either in the air conditioner for cars of a publication among claim 1 thru/or claim 24 or more using any one of fuzzy control or the neuro-control.
[Claim 26] The air conditioner for cars characterized by using one or more of outside air temperature, the vehicle speed, a room temperature, intensity of radiation, or outlet Mohd for either in the air conditioner for cars of a publication as any one or more input data of said fuzzy control or the neuro-control among claim 6 thru/or claim 8, claim 12, or claim 25.
[Claim 27] It is the air conditioner for cars characterized by lessening the amount of reflection to actuation of said crew or control of a control change request in the air conditioner for cars given in either compared with the time beyond a predetermined value among claim 1 thru/or claim 26 when the temperature or heat exchanger temperature of a car driving means cooling means is below a predetermined value.
[Claim 28] It is the air conditioner for cars characterized by lessening the amount of reflection to actuation of said crew or control of a control change request in the air conditioner for cars given in either compared with the time beyond a predetermined value among claim 1 thru/or claim 27 when the elapsed time after a dc-battery injection, car driving means actuation, air-conditioning actuation, or ventilation actuation is below a predetermined value.
[Claim 29] It is the air conditioner for cars characterized by changing the detection value of the detection means which has effectiveness in removal of the prevention said aperture cloudiness or with frost, aperture cloudiness, or frost in the direction in which aperture cloudiness tends to occur with time amount in the air conditioner for cars given in either among claim 1 thru/or claim 28.
[Claim 30] It is the air conditioner for cars characterized by changing any one or more detection values of dew condensation or the window transmittance of said humidity or a window, or the window temperature detection means in the direction in which aperture cloudiness tends to occur with time amount in the air conditioner for cars given in either among claim 1 thru/or claim 29.
[Claim 31] It is the air conditioner for cars characterized by changing said window temperature presumption means in the direction in which aperture cloudiness tends to occur with time amount in the air conditioner for cars given in either among claim 1 thru/or claim 30.
[Claim 32] It is the air conditioner for cars characterized by for after actuation of said crew or a control change request to lessen the amount of modification of the detection value of the detection means which has effectiveness in removal of the prevention the aperture cloudiness changed with said time amount, or with frost, aperture cloudiness, or frost compared with a said crew's actuation or control change-request front in the air conditioner for cars given in either among claim 1 thru/or claim 31.
[Claim 33] It is the air conditioner for cars characterized by for after actuation of said crew or a control change request to lessen the amount of modification of any one or more detection values of dew condensation or the window transmittance of the said humidity or the window changed with said time amount compared with a said crew's actuation or control change-request front, or the window temperature detection means in the air conditioner for cars given in either among claim 1 thru/or claim 32.
[Claim 34] It is the air conditioner for cars characterized by after actuation of said crew or a control change request lessening the amount of modification of said window temperature presumption means changed with said time amount compared with a said crew's actuation or control change-request front in the air conditioner for cars given in either among claim 1 thru/or claim 33.

[Claim 35] The air conditioner for cars characterized by setting to the air conditioner for cars of a publication, and changing into either the amount of modification or the amount of amendments changed or amended according to actuation of the crew of said past, or a control change request according to any one or more detection values of dew condensation or the window transmittance of said humidity or a window, or the window temperature detection means among claim 1 thru/or claim 34.
[Claim 36] The air conditioner for cars characterized by to set to the air conditioner given in either for cars among claim 1 thru/or claim 35, and to change or amend mostly, so that it is separated from the amount of modification or the amount of amendments changed or amended according to actuation of the crew of said past, or a control change request of any one or more detection values of dew condensation or the window transmittance of said humidity or a window, or the window temperature detection means with the aperture cloudiness generating value which assumed beforehand.
[Claim 37] It is the air conditioner for cars characterized by comparing when it was in case of rainy weather or snowfall, it presumed or detected, it was not in case of rainy weather or snowfall and it presumed or detects, and making [many] the amount of modification or the amount of amendments changed or amended according to actuation of the crew of said past, or a control change request in the air conditioner for cars given in either among claim 1 thru/or claim 36.
[Claim 38] (a) The actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (b) A detection means to detect the physical quantity which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, (c) According to the detection value of actuation of crew, a control change request, or said detection means, it has the antifog control means which controls the control state of said actuator automatically. Said antifog control means The air conditioner for cars characterized by changing the detection value of said detection means and using for control according to the count presumed or detected when it was in case of rainy weather or snowfall.
[Claim 39] It is the air conditioner for cars characterized by lessening the amount of amendments of said window temperature presumption means in the air conditioner for cars given in either compared with the time with many counts presumed or detected when it was in case of rainy weather or snowfall among claim 1 thru/or claim 38 when it is in case of rainy weather or snowfall and there are few counts presumed or detected.
[Claim 40] It is the air conditioner for cars characterized by to lessen the amount of modification or the amount of amendments which measures when it is in case of rainy weather or snowfall, there are few counts presumed or detected, it is in case of rainy weather or snowfall and there are many counts presumed or detected, and changes or amends according to actuation of the crew of said past, or a control change request in the air conditioner given in either for cars among claim 1 thru/or claim 39.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the air conditioner for cars which can obtain high fog resistance ability also by the large low cost humidity sensor of especially an error about the air conditioner for cars which performs antifog control of a window according to the detection value of a humidity sensor.
[0002]
[Description of the Prior Art] Conventionally, the air conditioner for cars brings crew a comfortable environment in all climates and transit conditions, prevents aperture cloudiness or with frost, or performs removal of aperture cloudiness or frost, secures an operator's field of view, and aims at enabling safe and comfortable operation.
[0003] Conventionally, it sets to JP,8-85336,A. When judging that it asks for the absolute humidity of the detection value empty vehicle interior of a room of the humidity sensor of the vehicle interior of a room, and a windowpane tends to bloom cloudy based on the comparison result of this absolute humidity and the specific humidity at saturation in a windowpane Control so that the amount of open air installation is made [many] and a windowpane does not bloom cloudy, and the amount of open air installation is lessened so that a compressor will not consume power vainly, if it judges that a windowpane cannot bloom cloudy easily. The air conditioner for cars currently controlled to reduce the operating ratio of a compressor and to be able to improve fuel consumption is proposed. Moreover, in order to carry out above-mentioned antifog control correctly, the very small humidity sensor with error is used for this air conditioner for cars.
[0004]
[Problem(s) to be Solved by the Invention] However, when a small humidity sensor with error is very high cost, for a certain reason, a certain amount of error cannot perform exact antifog control, but the problem that the cloudiness of a windowpane occurs, or the operating ratio of a compressor increases and fuel consumption gets worse surely has it. Moreover, although window temperature (dew point temperature of window glass) needed to be presumed for exact antifog control, as it was in JP,7-179120,A, there were very many parameters required to presume window temperature correctly like bashful **, outside air temperature, intensity of radiation, or the vehicle speed, and creation of the formula of window temperature was very difficult for them.
[0005]
[Objects of the Invention] Without using the humidity sensor of high cost, the purpose of this invention is amending the control characteristic of antifog control, or the detection value of a humidity sensor by actuation of the past crew or the control change request, and is to offer the air conditioner for cars which can perform removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost with an efficiently or sufficient precision correctly easily by low cost. Moreover, it is in offering the air conditioner for cars which can create the formula of window temperature very easily. Furthermore, even when a cheap humidity sensor with a large error is used, it is in offering the air conditioner [low cost /

in comparison] for cars which can raise easily the fog resistance ability which removes prevention, aperture cloudiness, or frost aperture cloudiness or with frost.
[0006]
[Means for Solving the Problem] According to invention according to claim 1, even if an error is large and uses a cheap sensor by learning actuation of the past crew or a control change request, and changing the control characteristic which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost according to the study result, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request.
[0007] According to invention according to claim 2, even if an error is large and uses a cheap sensor by learning actuation of the past crew or a control change request, and amending any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means according to the study result, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request.
[0008] According to invention according to claim 3, even if an error is large and uses a cheap sensor by learning actuation of the past crew or a control change request, and amending the operating ratio of a compressor or a heat exchanger, capacity, or any one or more physical values of the actuation conditions according to the study result, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request.
[0009] According to invention according to claim 4, actuation of the past crew or a control change request is learned. By amending any one or more physical values of the blow-off rate of the air-conditioning style to the airflow or the window of the air-conditioning style to the changing condition or window to outlet Mohd including the blowdown of the air-conditioning style to a window according to the study result Even if an error is large and uses a cheap sensor, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request.
[0010] According to invention according to claim 5, even if an error is large and uses a cheap sensor by learning actuation of the past crew or a control change request, and amending whenever [to a window / blow-off temperature / of the air-conditioning style] according to the study result, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request. Moreover, according to invention given in either claim 6 or thru/or the claims 8 To the control which has effectiveness in removal of the prevention with a window temperature presumption means, aperture cloudiness, or frost, aperture cloudiness, or frost Optimal antifog control can be easily performed only by plotting on which conditions aperture cloudiness occurred by applying any one or more of fuzzy control or the neuro-control to calculation of the target temperature a heat exchanger or near a heat exchanger. Furthermore, the formula of the target temperature window temperature presumption, a heat exchanger, or near a heat exchanger can be created very easily.
[0011] According to invention given in either claim 9 or thru/or the claims 11 The detection value of a detection means to detect the physical quantity which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, Dew condensation or the window transmittance of humidity or a window, or any one or more detection values of the window temperature detection means, Or the optimal compressor operating ratio can be set up by changing a window temperature presumption means with the parameter which can presume air-conditioning operating time, and using it for antifog control. Moreover, according to invention according to claim 12, optimal antifog control can be easily performed only by plotting on which conditions aperture cloudiness occurred by using any one or more of fuzzy control or the neuro-control for calculation of the amount of modification, or the amount of amendments. Furthermore, according to invention according to claim 13, it is characterized by actuation of crew or a control change request being the prevention with aperture cloudiness or frost, aperture cloudiness, or the removal means of frost.
[0012] According to invention according to claim 14, a window heating means to heat the foot differential-gear selection means or window which chooses outlet Mohd who includes the blowdown of the air-conditioning style to the defroster selection means or window which chooses the blowdown of the air-conditioning style to a window as the prevention with aperture cloudiness or frost, aperture

cloudiness, or a removal means of frost may be used. Moreover, according to invention according to claim 15, reflecting actuation of crew or a control change request can prevent the fault by the operation mistake or the incorrect control change request by carrying out, after carrying out actuation of crew or a control change request and predetermined time passes.

[0013] According to invention according to claim 16, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification, or the amount of amendments [after actuation of crew or a control change request becomes the 1st count of predetermined until actuation of crew or a control change request becomes the 1st count of predetermined]. Moreover, according to invention according to claim 17, after actuation of crew or a control change request becomes the 2nd count of predetermined, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification, or the amount of amendments [before actuation of crew or a control change request becomes the 2nd count of predetermined]. Furthermore, according to invention according to claim 18, crew can realize or check that it is antifog control suitable for crew's air-conditioning feeling by establishing the display means which displays [vision-] or displays [acoustic-sense-] the amount of modification, or the amount of amendments.

[0014] You may make it prepare the modification means or adjustment device in which modification or adjustment is possible for the amount of modification, or the amount of amendments by approaches other than the prevention with aperture cloudiness or frost, aperture cloudiness, or the removal means of frost according to invention according to claim 19. Moreover, you may make it include the coincidence input of two or more input means for the amount of modification, or the amount of amendments at least with approaches other than the prevention with aperture cloudiness or frost, aperture cloudiness, or the removal means of frost according to invention according to claim 20. Furthermore, according to invention according to claim 21, modification or amendment may be made to be performed near the condition actuation of the past crew or a control change request was performed.

[0015] According to invention according to claim 22, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification [after the parameter which can presume air-conditioning operating time reaches the 1st predetermined value until the parameter which can presume air-conditioning operating time reaches the 1st predetermined value]. Moreover, according to invention according to claim 23, after the parameter which can presume air-conditioning operating time reaches beyond the 2nd predetermined value, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification [before the parameter which can presume air-conditioning operating time reaches beyond the 2nd predetermined value]. Furthermore, according to invention according to claim 24, the parameter which can presume air-conditioning operating time is good also as any one or more counts in any one or more elapsed time in after a dc-battery injection, car driving means actuation, air-conditioning actuation, or ventilation actuation, the count of car driving means actuation, the count of ignition-on, the count of accessory power-source ON, or the count of starter-on.

[0016] According to invention according to claim 25, optimal antifog control can be easily performed by computing the conditions which perform modification or amendment or more using any one of fuzzy control or the neuro-control. Moreover, according to invention according to claim 26, one or more of outside air temperature, the vehicle speed, a room temperature, intensity of radiation, or outlet Mohd may be used as any one or more input data of fuzzy control or the neuro-control. Furthermore, according to invention according to claim 27, when the temperature or heat exchanger temperature of a car driving means cooling means is below a predetermined value, compared with the time beyond a predetermined value, it is characterized by lessening the amount of reflection to actuation of crew or control of a control change request. Here, the temperature of a car driving means cooling means is the temperature of the cooling water which cools the engine carried in the car, or the temperature of the cooling water which cools the drive motor carried in the car. Moreover, heat-exchanger temperature is the skin temperature of the exhaust-heat-recovery machine which collects exhaust heat of exoergic components, such as skin temperature of the evaporator of a refrigerating cycle, after [Eve] temperature, or an electrical part.

[0017] According to invention according to claim 28, when the elapsed time after a dc-battery injection, car driving means actuation, air-conditioning actuation, or ventilation actuation is below a predetermined value, compared with the time beyond a predetermined value, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of reflection to actuation of crew or control of a control change request. Moreover, you may make it change the detection value of the detection means which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost in the direction in which aperture cloudiness tends to occur with time amount according to invention according to claim 29. Furthermore, you may make it change any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means in the direction in which aperture cloudiness tends to occur with time amount according to invention according to claim 30. Furthermore, you may make it change a window temperature presumption means in the direction in which aperture cloudiness tends to occur with time amount according to invention according to claim 31.
[0018] According to invention according to claim 32, after actuation of crew or a control change request can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification of the detection value of the detection means which has effectiveness in removal of the prevention the aperture cloudiness changed with time amount, or with frost, aperture cloudiness, or frost compared with a crew's actuation or control change-request front. Moreover, according to invention according to claim 33, after actuation of crew or a control change request can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification of any one or more detection values of dew condensation or the window transmittance of the humidity or the window changed with time amount, or the window temperature detection means compared with a crew's actuation or control change-request front. Furthermore, according to invention according to claim 34, after actuation of crew or a control change request can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification of the window temperature presumption means changed with time amount compared with a crew's actuation or control change-request front.
[0019] You may make it change the amount of modification or the amount of amendments changed or amended according to actuation of the past crew or a control change request according to any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means according to invention according to claim 35. Moreover, you may make it change or amend mostly, so that it is separated from the amount of modification or the amount of amendments changed or amended according to actuation of the past crew or a control change request of any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means with the aperture cloudiness generating value assumed beforehand according to invention according to claim 36.
[0020] When according to invention according to claim 37 it was in case of rainy weather or snowfall and presumed or detects Since it turns out that window temperature becomes almost equal to outside air temperature, when it was in case of rainy weather or snowfall and presumed or detects The control characteristic of antifog control can be promptly doubled with crew's air-conditioning feeling by comparing, when it was not in case of rainy weather or snowfall and presumed or detects, and making [many] the amount of modification or the amount of amendments changed or amended according to actuation of the past crew or a control change request. Moreover, even when according to invention according to claim 38 it was in case of rainy weather or snowfall and a cheap detection means with many errors is used by changing the detection value of a detection means detect the physical quantity which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, according to the count presumed or detected, and using for control, the control characteristic of antifog control can double with crew's air-conditioning feeling.
[0021] When it is in case of rainy weather or snowfall, and there are few counts presumed or detected, since it turns out that window temperature becomes almost equal to outside air temperature when according to invention according to claim 39 it was in case of rainy weather or snowfall and presumed

or detects, and it is in case of rainy weather or snowfall, compared with the time with many counts presumed or detected, it is desirable to lessen the amount of amendments of a window temperature presumption means. Moreover, it may compare, when according to invention according to claim 40 it is in case of rainy weather or snowfall, there are few counts presumed or detected, it is in case of rainy weather or snowfall and there are many counts presumed or detected, and the amount of modification or the amount of amendments changed or amended according to actuation of the past crew or a control change request may be lessened.

[0022]

[Embodiment of the Invention] [Configuration of the 1st operation gestalt] Drawing 1 thru/or drawing 18 are what showed the 1st operation gestalt of this invention, drawing 2 is drawing having shown the whole air-conditioning unit configuration, drawing 3 is drawing having shown the instrument panel of a car, and drawing 4 is drawing having shown the air-conditioner control panel.

[0023] The air conditioner for cars of this operation gestalt is constituted so that the actuator of each air-conditioning equipment in the air-conditioning unit 1 which air-conditions the vehicle interior of a room of cars, such as an automobile carrying an engine, may be controlled by the air-conditioning control unit (control-circuit substrate: henceforth Air-conditioner ECU) 10. The air-conditioning unit 1 is an air-conditioner unit which the temperature control of the air-conditioning zone by the side of the driver's seat (the backseat on the right-hand side of a car is included) of the vehicle interior of a room and the air-conditioning zone by the side of a passenger seat (the backseat on the left-hand side of a car is included) is carried out, and mutually-independent [of outlet Mohd's modification] is carried out, and can perform it.

[0024] The air-conditioning unit 1 is equipped with the air-conditioning duct 2 arranged ahead of [of a car] the vehicle interior of a room. The inside-and-outside mind change door 3 and the blower 4 are formed in the upstream of this air-conditioning duct 2. The inside-and-outside mind change door 3 is an inlet port change means to drive with the actuator of servo motor 5 grade, and to change the opening (the so-called inlet port Mohd) of bashful inlet port 6 and open air inlet port 7. A blower 4 is a centrifugal fan made to generate the airstream which a rotation drive is carried out by the blower motor 9 controlled by the blower drive circuit 8, and goes in the vehicle interior of a room in the air-conditioning duct 2.

[0025] The evaporator (heat exchanger for cooling) 41 which constitutes the heat exchanger (air-conditioning equipment) of this invention which cools the air which passes through the inside of the air-conditioning duct 2 is formed in the center section of the air-conditioning duct 2. Moreover, the heater core (heat exchanger for heating) 42 which heats the air which passes the 1st and 2nd air duct 11 and 12 is formed in the downstream of the evaporator 41. In addition, the 1st air duct 11 and the 2nd air duct 12 are divided by the diaphragm 14. The drivers side for carrying out mutually-independent [of the temperature control of the drivers side air-conditioning zone of the vehicle interior of a room and a passenger side air-conditioning zone], and performing it and the passenger side air mix (A/M) doors 15 and 16 are formed in the downstream of the heater core 42. And a drivers side and the passenger side A/M doors 15 and 16 are driven with the actuator of a servo motor 17 and 18 grades, and adjust whenever [blow-off temperature / of the air which blows off towards a drivers side and a passenger side].

[0026] Here, the evaporator 41 of this operation gestalt accomplishes one component part of a refrigerating cycle. The refrigerant compressor which belt driving of the refrigerating cycle is carried out to the output shaft of the engine for car transit carried in the engine room of a car, and compresses and carries out the regurgitation of the refrigerant (compressor), The refrigerant condenser which makes the refrigerant breathed out from this compressor condensate-ize (capacitor), It consists of a receiver (receiver) which carries out vapor liquid separation of the liquid cooling intermediation which flowed from this capacitor, an expansion valve to which adiabatic expansion of the liquid cooling intermediation which flowed from this receiver is carried out, and an above-mentioned evaporator (refrigerant evaporator) 41 which carries out the evaporation evaporation of the refrigerant of the gas-liquid two phase state which flowed from this expansion valve.

[0027] A compressor is equivalent to the air-conditioning equipment (actuator) of this invention, and the

rotational motion force from an engine is [among these] intermittent with the electromagnetic clutch (it is equivalent to the actuator of this invention) controlled by the air-conditioner ECU 10. And when an electromagnetic clutch is turned on and a compressor starts, an evaporator 41 cools and dehumidifies the air which passes through the inside of the air-conditioning duct 2. Moreover, with this operation gestalt, the capacity good transformation compressor which has the electromagnetic capacity control valve which performs capacity adjustable control based on the control signal outputted according to the comparison result of the after [Eve] temperature (TE) which is the detection value of the after [Eve] temperature sensor 74, and after [target Eve] temperature (TEO) is used.

[0028] and at the air down-stream edge (front face of an instrument panel 50) of each blow-off duct which is open for free passage to the air downstream of the 1st air duct 11 The drivers side defroster (DrDEF) outlet 20 for blowing off an air-conditioning wind towards the inside of the front window glass of a drivers side, as shown in drawing 2 and drawing 3 , The drivers side pin center,large face (DrFACE) outlet 21 and the drivers side side face (DrFACE) outlet 22 for blowing off an air-conditioning wind towards the cephalothorax of the crew of a drivers side, or the inside of side window glass, The drivers side foot (DrFOOT) outlet 23 for blowing off an air-conditioning wind towards guide-peg Motobe, the crew of a drivers side, is carrying out opening.

[0029] moreover, at the air down-stream edge (front face of an instrument panel 50) of each blow-off duct which is open for free passage to the air downstream of the 2nd air duct 12 The passenger side defroster (PaDEF) outlet 30 for blowing off an air-conditioning wind towards the inside of the front window glass of a passenger side, The passenger side pin center,large face (PaFACE) outlet 31 and the passenger side side face (PaFACE) outlet 32 for blowing off an air-conditioning wind towards the cephalothorax of the crew of a passenger side, or the inside of side window glass, The passenger side foot (PaFOOT) outlet 33 for blowing off an air-conditioning wind towards guide-peg Motobe, the crew of a passenger side, is carrying out opening.

[0030] And in the 1st and 2nd air duct 11 and 12, the drivers side for carrying out mutually-independent [of the setup of outlet Mohd of the drivers side of the vehicle interior of a room and a passenger side], and performing it, the passenger side outlet change doors 24-26, and 34-36 are prepared. And a drivers side, the passenger side outlet change doors 24-26, and 34-36 are the Mohd change doors which drive with the actuator of servo motors 28, 29, and 38 and 39 grades, and change outlet Mohd of a drivers side and a passenger side, respectively. Here, as outlet Mohd of a drivers side and a passenger side, FACE Mohd, B/L Mohd, FOOT Mohd, F/D Mohd, DEF Mohd, etc. have.

[0031] In addition, a drivers side and the passenger side outlet change doors 24 and 34 are the drivers side which mutually-independent [of the DrDEF outlet 20 and the PaDEF outlet 30] is carried out, and can open and close them, and a passenger side defroster door (air-conditioning equipment), and the servo motors 28 and 38 constitute the actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost. And two or more swing louvers which can change the blow-off direction of the air-conditioning style which blows off from each outlet are attached in the pin center,large grill and side grill which form the DrFACE outlets 21 and 22 and the PaFACE outlets 31 and 32, respectively.

[0032] An air-conditioner ECU 10 is equivalent to the storage means of this invention, a window temperature detection means, a window temperature presumption means, and an antifog control means, and when the ignition switch which manages starting and a halt of an engine is thrown in (IG-ON), if DC power supply are supplied from the dc-battery (not shown) which is the mounted power source carried in the car, it is constituted so that data processing and control processing may be started. As shown in the air-conditioner ECU 10 at drawing 2 and drawing 4 , each switch signal from the various switches on the air-conditioner control panel 51 installed in one is inputted into the instrument panel 50 of the front face of the vehicle interior of a room.

[0033] And a liquid crystal display (display) 52, the inlet port Mohd circuit changing switch 53, the front defroster switch (henceforth a DEF switch) 54, the rear defroster (defogger) switch 55, the DUAL switch 56, the outlet Mohd (MODE) circuit changing switch 57, the blower airflow circuit changing switch 58, the AUTO switch 60, the off-switch 61, the A/C switch 59, the driver's seat (DRIVER) side

temperature configuration switch 62, and the passenger seat (PSSENGER) side temperature configuration-switch 63 grade are installed in the air-conditioner control panel 51. The DUAL switch 56 of the above is a right-and-left independent-control command means to order it the right-and-left independent temperature control which carries out mutually-independent [of the temperature control in a drivers side air-conditioning zone, and the temperature control in a passenger side air-conditioning zone], and performs them. Moreover, the MODE circuit changing switch 57 changes outlet Mohd to FACE Mohd, B/L Mohd, FOOT Mohd, or F/D Mohd according to actuation of crew.

[0034] And the laying temperature of the air-conditioning zone of a drivers side and a passenger side, outlet Mohd, blower airflow, etc. are displayed on a display 52. And the drivers side temperature configuration switch 62 is a drivers side temperature setting means for setting the temperature in a drivers side air-conditioning zone as desired temperature, and consists of rise switch 62a and down switch 62b. Moreover, the passenger side temperature configuration switch 63 is a passenger side temperature setting means for setting the temperature in a passenger side air-conditioning zone as desired temperature, and consists of rise switch 63a and down switch 63b. In addition, various kinds of actuation switches on the air-conditioner control panel 51 may be formed on the display 52.

[0035] Moreover, after the microcomputer of the common knowledge constituted including functions, such as CPU, memory (ROM, or EEPROM, RAM), and an I/O Port (an input/output circuit), is prepared in the interior of an air-conditioner ECU 10 and A/D conversion of the sensor signal from various sensors is carried out by the input circuit, it is constituted so that it may be inputted into a microcomputer. That is, the sun sensor 73 grade as a solar radiation detection means which detects the intensity of radiation (solar intensity) irradiated in the bashful ** sensor 71 as an inner atmospheric temperature detection means to detect the air temperature (for it to also be called a bashful ** and following room temperature) of the vehicle interior of a room, the outside-air-temperature sensor 72 as an outside-air-temperature detection means to detect a vehicle outdoor air temperature (henceforth outside air temperature) and a drivers side, and a passenger side air-conditioning zone is connected to the input circuit of an air-conditioner ECU 10.

[0036] moreover, in the input circuit of an air-conditioner ECU 10 As an after [Eve] temperature detection means to detect the air temperature (henceforth after [Eve] temperature) immediately after passing an evaporator 41 As a cooling water temperature detection means to detect the cooling water temperature of the engine of the after [** Eve] temperature sensor 74, and a car The speed sensor 77 grade as a vehicle speed detection means to detect the ****** coolant temperature sensor 75, the humidity sensor 76 as a humidity detection means to detect near [crew] relative humidity (relative humidity of the vehicle interior of a room), and the travel speed (vehicle speed) of a car is connected.

[0037] The sun sensor 73 is installed among these on the instrument panel 50 near [by the side of the method of the forefront of the vehicle interior of a room] the front window. In addition, a sun sensor 73 detects the intensity of radiation (solar intensity) irradiated in a drivers side air-conditioning zone, detects the intensity of radiation (solar intensity) irradiated in a passenger side air-conditioning zone as a drivers side solar intensity detection means (for example, photodiode) to generate output signal TS' (Dr) corresponding to the solar intensity, and has a passenger side solar intensity detection means (for example, photodiode) to generate output signal TS' (Pa) corresponding to the solar intensity. Here, the humidity sensor 76 of this operation gestalt is the thing of a large low price with error, and is held in the hollow formed in the front face of the instrument panel 50 near the driver's seat with the bashful ** sensor 71. In addition, the hollow is closed by lid 50a in which the bleeder was formed.

[0038] The [control approach of the 1st operation gestalt] Next, the air-conditioning control approach by the air-conditioner ECU 10 of this operation gestalt is explained based on drawing 1 thru/or drawing 18 . Here, drawing 5 is the flow chart which showed an example of the control program of an air-conditioner ECU 10.

[0039] First, if an ignition switch is turned on and DC power supply are supplied to an air-conditioner ECU 10, activation of the control program (routine of drawing 5) beforehand memorized by ROM will be started. At this time, the contents of storage of the memory (RAM) for data processing built in the microcomputer of the air-conditioner ECU10 interior etc. are initialized first (step S1). Next, various

data are read into the memory (RAM) for data processing. That is, the switch signal from various actuation switches and the sensor signal from various sensors are inputted (step S2).
[0040] Especially, the output signal (vehicle speed signal) SPD corresponding to the vehicle speed which is the output signal (outside-air-temperature signal) TAM corresponding to the outside air temperature which is the detection value of the output signal (inner atmospheric temperature signal) TR corresponding to bashful ** which is the detection value of the bashful ** sensor 71, and the outside-air-temperature sensor 72, and the detection value of a speed sensor 77 etc. is inputted, and it memorizes in the memory for data processing. Moreover, output-signal (sun sensor signal) TS' (Dr) corresponding to the intensity of radiation (solar intensity) which is the detection value of a sun sensor 73, TS' (Pa), etc. are inputted, and it memorizes in the memory for data processing.
[0041] Next, the solar intensity TS (Dr) and TS (Pa) computed by the time constant (delay) of T1 (sec) to sun sensor signal TS' (Dr) memorized at the above-mentioned step S2 and TS' (Pa) is determined. namely, sun sensor signal TS' (Dr), TS' (Pa), the several 1 following formula, and several 2 formula -- being based -- the solar intensity TS (Dr) and TS (Pa) and the time constant T1 of the vehicle interior of a room It calculates (step S3).
[0042]
[Equation 1]

$$TS(Dr) = \{TS'(Dr) + (T1/T)\,TSn\text{-}1(Dr)\} / (T1+T)$$

[Equation 2]

$$TS(Pa) = \{TS'(Pa) + (T1/T)\,TSn\text{-}1(Pa)\} / (T1+T)$$

[0043] However, T is a control period (for example, for [for / 1 second / -] 4 seconds), TSn-1(Dr) is a value in front of 1 period of TS (Dr), and TSn-1(Pa) is a value in front of 1 period of TS (Pa). Moreover, T1 It is the value of a time constant prepared in the solar intensity TS (Dr) and TS (Pa) required to control the blower control voltage VA (Dr) and VA (Pa) impressed to the blower motor 9 of a blower 4, a drivers side, the passenger side outlet change doors 24-26, 34-36 and a drivers side, and the passenger side A/M doors 15 and 16, for example, is for [for / 30 seconds / -] 61 seconds.
[0044] Next, based on the above stored data, the several 3 following formula, and several 4 formula, TAO (Pa) is calculated [whenever / target blow-off temperature / of a drivers side] whenever [TAO (Dr) and target blow-off temperature / of a passenger side] (whenever [target blow-off temperature] decision means : step S4).
[0045]
[Equation 3]

$$TAO(Dr) = KSET \cdot TSET(Dr) - KR \cdot TR - KAM \cdot TAM - KS \cdot TS(Dr) + Kd(Dr) \times \{CD(Dr) + Ka(Dr)(10-TAM)\} \times \{TSET(Dr) - TSET(Pa)\} + C$$

[Equation 4]

$$TAO(Pa) = KSET \cdot TSET(Pa) - KR \cdot TR - KAM \cdot TAM - KS \cdot TS(Pa) + Kd(Pa) \times \{CD(Pa) + Ka(Pa)(10-TAM)\} \times \{TSET(Pa) - TSET(Dr)\} + C$$

[0046] However, TSET (Dr) and TSET (Pa) express the laying temperature of a drivers side air-

conditioning zone, and the laying temperature of a passenger side air-conditioning zone, respectively, and TRTAM expresses outside air temperature whenever [vehicle room air temperature], respectively. KSET, KR, KAM, KS and Kd (Dr), and Kd (Pa) express the temperature-gradient amendment gain of gain, outside-air-temperature gain, intensity-of-radiation gain, a drivers side, and a passenger side air-conditioning zone whenever [temperature setting gain and vehicle room air temperature], respectively.
[0047] In addition, Ka (Dr) and Ka (Pa) express the gain which amends the effect degree which outside air temperature TAM exerts on each air-conditioning temperature of a drivers side air-conditioning zone and a passenger side air-conditioning zone, respectively, and the constant [CD / CD (Dr) and / (Pa)] according to the above-mentioned effect degree and C express an amendment constant. Here, values, such as Ka (Dr), Ka (Pa), CD (Dr), and CD (Pa), change with various parameters, such as a form of a car, and the blow-off direction from each outlet of magnitude and the air-conditioning unit 1.
[0048] whenever [next, / target blow-off temperature / of the drivers side for which it asked by the above-mentioned step S4, and a passenger side] -- TAO (Dr) and TAO (Pa) -- being based -- blower airflow -- {-- all -- blower control voltage VA} impressed to the airflow:blower 4 is calculated (step S5). Specifically, the above-mentioned blower control voltage VA has been obtained by carrying out equalization processing of those blower control voltage VA (Dr) and VA (Pa) while it bases for it and asks the property Fig. of drawing 6 for the blower control voltage VA (Dr) and VA (Pa) which suited TAO (Dr) and TAO (Pa) whenever [target blow-off temperature], respectively.
[0049] Next, based on TAO (Dr), TAO (Pa), and the outlet Mohd property over whenever [target blow-off temperature / which was shown in the property Fig. of drawing 7], each outlet Mohd of a drivers side and a passenger side air-conditioning zone is determined whenever [target blow-off temperature / of the drivers side for which it asked by the above-mentioned step S4, and a passenger side] (step S6). In outlet Mohd's decision, whenever [above-mentioned target blow-off temperature], TAO (Dr) and TAO (Pa) are missing from high temperature from low temperature, and, specifically, are determined that it will become FACE Mohd, B/L Mohd, and FOOT Mohd. Moreover, it is fixed to one of outlet Mohd among FACE Mohd, B/L Mohd, FOOT Mohd, and F/D Mohd by operating the MODE circuit changing switch 57 prepared in the air-conditioner control panel 51.
[0050] In addition, above-mentioned FACE Mohd is outlet Mohd who turns an air-conditioning wind to crew's upper half of the body (cephalothorax), and bursts into laughter. Moreover, B/L Mohd is outlet Mohd who turns an air-conditioning wind to crew's upper half of the body (cephalothorax) and guide-peg Motobe, and bursts into laughter. And FOOT Mohd is outlet Mohd who turns an air-conditioning wind to guide-peg Motobe, crew, and bursts into laughter. Furthermore, F/D Mohd is outlet Mohd who turns an air-conditioning wind to the inside of guide-peg Motobe, crew, and the front window of a car, and bursts into laughter. Moreover, it is fixed to DEF Mohd who turns an air-conditioning wind to the inside of front window glass, and bursts into laughter when the DEF switch 54 formed in the air-conditioner control panel 51 is pushed.
[0051] Next, the target A/M opening SW (Pa) of the target A/M opening [of the drivers side A/M door 15] SW (Dr), (%), and passenger side A/M door 16 and (%) are calculated (step S7). In addition, the operation of such the target A/M opening SW (Dr) and the target A/M opening SW (Pa) is performed based on the cooling water temperature (TW) which is the detection value of the cooling coolant temperature sensor 75, and the several 5 following formula and several 6 formula whenever [target blow-off temperature / of a drivers side and a passenger side]. [TAO (Dr), TAO (Pa), and] [the after / Eve / temperature (TE) which is the detection value of the after / Eve / temperature sensor 74, and]
[0052]
[Equation 5]
$$SW(Dr) = \{TAO(Dr) - TE\} \times 100 / (TW - TE)$$

[Equation 6]
$$SW(Pa) = \{TAO(Pa) - TE\} \times 100 / (TW - TE)$$

[0053] Next, the routine of drawing 1 and drawing 15 starts, and antifog control which has effectiveness

in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost is performed (step S8). Next, an output signal is sent to the blower drive circuit 8 so that it may become the determined blower control voltage VA (Dr) and VA (Pa). Moreover, energization control of the servo motors 28, 29, 38, and 39 is carried out so that it may become determined outlet Mohd. Furthermore, energization control of the servo motors 17 and 18 is carried out so that it may be set to the determined target A/M opening SW (Dr) and SW (Pa). Moreover, when a compressor judging flag is ON (CFLAG=1), an electromagnetic clutch is turned on, and when a compressor judging flag is OFF (CFLAG=O), the electromagnetic clutch of a compressor is turned off (step S9). Next, after control period time amount (between [for / 0.1 seconds / -] T:, for example, 4.0 seconds) predetermined at step S10 passes, it returns to processing of step S2.

[0054] Next, the antifog control by the air-conditioner ECU 10 is explained based on drawing 8 thru/or drawing 18 . Here, drawing 1 is the flow chart which showed the humidity sensor appearance value amendment control by the air-conditioner ECU 10, and drawing 15 is the flow chart which showed the antifog control based on the humidity sensor appearance value by the air-conditioner ECU 10.

[0055] First, if the routine of drawing 1 starts, since it does not have the sensor which carries out direct detection of the window temperature (dew point temperature of front window glass) required in order to calculate the near [a window] relative humidity RHw, and specific humidity at saturation RHW, based on the detection value of various kinds of sensors which detect the air-conditioning thermal load of the vehicle interior of a room, temperature (window temperature) of front window glass is presumed (window temperature presumption means: step S11). (operation)

[0056] Here, presumption of the temperature of front window glass, i.e., the operation of window temperature, is calculated using the neuro-control shown in drawing 8 thru/or drawing 11 . As input data of this neuro-control, as shown in drawing 10 , the car travel speed (vehicle speed) SPD which are the intensity of radiation TS which are the outside air temperature TAM which is the detection value of bashful ** TR which is the detection value of the bashful ** sensor 71, and the outside-air-temperature sensor 72, and the detection value of a sun sensor 73, and the detection value of a speed sensor 77 is used. Since the neural network who uses this neuro-control for the operation of the window temperature of drawing 8 (a), and the neural network who uses for the operation of the window temperature of drawing 9 (c) are the same configurations fundamentally, he explains taking the case of the neural network who uses for the operation of the window temperature of drawing 8 (a).

[0057] A neural network is a certain input signal (in the example of drawing 8). So that the output may become the value (teacher data) of the request set up beforehand, when SPD, TS, TAM, and TR are given The back propagation error learning function (back proper GESHON function) to correct the coupling coefficient 106 (synapse load) between each neurone 105 of the input layer [which was prepared in the neural network { drawing 8 (a)}] 101, 1st and 2nd interlayer 102 and 103, and output layer 104 interior It is the network of the layered structure which it had.

[0058] And when teacher data are changed, a coupling coefficient (synapse load) 106 is corrected by "making it learn repeatedly" so that it may become teacher data after the output to a certain input signal changing again. That is, it has the description which generates the correlation function (coupling coefficient 106) automatically from a lot of data (teacher data). Teacher data set up the value (output value of the request to an input signal) of the request for which it asked by experiment etc.

[0059] In the neural network { drawing 8 (a)} of a layered structure, there is no association between the neurone 105 of the same layer, and it is combined only by the neurone 105 of each class of order. The coupling coefficient 106 between the neurone 105 of each class expresses extent of the weight (strength) of each association, and the signal of the neurone 105 of the layer by the side of before turns into a signal with the large amplitude, and it is transmitted to the neurone 105 of the layer on the backside, so that the weight of association is large.

[0060] In addition, the value which the I/O value was standardized by 0-1 in the sensor signal etc., respectively as shown in drawing 10 (normalization), and was actually outputted needs the activity which carries out inverse transformation from 0-1. For example, the actual detection range of bashful ** (TR) detected by the bashful ** sensor 71 is 0 degree C - 50 degrees C, assigns this detection value to 0-

1 in the standardization (normalization) section 107, and usually inputs it into a neural network's { drawing 8 (a)}'s input layer 101. Since the value of 0-1 is outputted, inverse transformation also of the output from the output layer 104 is carried out to the actual value corresponding to a sensor signal etc. with the conversion map beforehand set up in the output transducer.

[0061] And in the state of car loading, the neural network { drawing 8 (a)} of each calculation section in an air-conditioner ECU 10 (operation part) calculates the output to an input, as shown in drawing 11 . That is, at each neurone 105, it is input signal O1 -On. An output is calculated by multiplying the coupling coefficient 106 (W1 -Wn) corresponding to each, and applying the value to the function called a sigmoid function. It outputs as an input of the neurone of consecutiveness to the count result. A final output is obtained by repeating this.

[0062] By the way, as a neural network's description, when a certain input signal is given Since it has the learning function of making the automatic correction of the coupling coefficient 106 between each class inside a neural network (synapse load) so that the output may become the value (teacher data) of the request set up beforehand, The output corresponding to a specific input condition can be changed into a desired value by changing the teacher data in a specific input condition, and making beforehand automatic correction of a coupling coefficient (synapse load) 106 using the high-speed arithmetic unit. And by other input conditions, even if it changes the output (teacher data) in a specific input condition, since automatic correction of the coupling-coefficient 106 whole is made so that a desired output value (teacher data) may be maintained, output modification by the specific input condition does not affect the output in other input conditions. Consequently, acquiring the desired antifog control characteristic is attained easily.

[0063] Next, the near [crew] relative humidity (relative humidity of the vehicle interior of a room) RH which is the detection value of a humidity sensor 76 is read. That is, as shown in the property Fig. of drawing 12 , after carrying out A/D conversion of the output voltage (V) outputted from a humidity sensor 76 in proportion to near [crew] relative humidity, it reads into the microcomputer of an air-conditioner ECU 10, and it memorizes in the memory (RAM) for data processing (step S12).

[0064] Next, the count of ON of the memorized ignition switch (count of IG-ON) is read (step S13). Here, the count of IG-ON is memorized by the memory (RAM) for data processing in the air-conditioner ECU 10 backed up with battery voltage. Next, the count of actuation of the memorized DEF switch 54 (count of DEF switch actuation) is read (step S14). Here, the count of DEF switch actuation is memorized by the memory (RAM) for data processing in the air-conditioner ECU 10 backed up with battery voltage.

[0065] Next, it judges whether the DEF switch 54 is operated (step S15). When this judgment result is YES (i.e., when a DEF switch is not operated until now), the count of ON of an ignition switch (count of IG-ON) is updated (step S16). (+1)

[0066] Moreover, when the judgment result of step S15 is NO, or after carrying out control processing of step S16, the amendment humidity value (after [amendment] relative humidity) of the humidity sensor 76 used for antifog control is calculated based on the several 7 following formula (step S17).

[Equation 7]

補正後相対湿度＝湿度センサ７６の検出値

＋KDEF ×ＤＥＦ操作回数－KIG×ＩＧ・ＯＮ回数

Here, it is KDEF =0.3 and KIG=0.1.

[0067] Therefore, since the detection value of a humidity sensor 76 may show the low value compared with actual relative humidity, it is amended so that the humidity sensor amendment humidity value used for antifog control may become high, so that the DEF switch 54 is pushed. Moreover, if the DEF switch 54 is not pushed, since the detection value of a humidity sensor 76 may show the high value compared with actual relative humidity, it is amended so that the humidity sensor amendment humidity value used for antifog control may become low. Even when this uses the cheap humidity sensor 76 with a large error for antifog control, antifog control can be performed correctly and easily by low cost.

[0068] Next, near [a window] relative humidity (RHw) is calculated from the window temperature

(TWG) presumed at the crew side relative humidity (after [amendment] humidity) RH computed at step S17, and step S11 (step S18). Next, the comfortable humidity of the crew side relative humidity (after [amendment] humidity) RH computed at step S17 is calculated. For example, it is based on the property Fig. of several 8 a following formula and following drawing 13 , for example, the relative humidity of 25 degrees C (RH25) is calculated (step S19).

[Equation 8]

$$RH25 = f(TR) \times RH / 100 \ (\%)$$

However, RH is the detection value (after [amendment] humidity) of a humidity sensor 76, and f (TR) is the function (humidity correction factor) of bashful ** TR.

[0069] Next, it is based on the property Fig. of several 9 a following formula and following drawing 14 as an antifog decision value for judging whether the inside of front window glass tend to bloom cloudy, or it is hard to bloom cloudy, and the specific humidity at saturation of 25 degrees C (moisture humidity: RHW25) is calculated from the window temperature (TWG) presumed at step S11 (step S20). In addition, although window temperature (TWG) is expressed with the function of bashful ** (TR), intensity of radiation (TS), outside air temperature (TAM), and the vehicle speed (SPD) as mentioned above, it serves as window temperature (TWG) = outside air temperature (TAM) in case of rainy weather.

[Equation 9]

$$RHW25 = f(TWG) \ (\%)$$

However, f (TWG) is the function of the window temperature TWG.

[0070] Next, the routine of drawing 15 starts, it is based on the property Fig. of drawing 16 , the relative humidity of 25 degrees C (RH25) and the specific humidity at saturation of 25 degrees C as an antifog decision value (RHW25) are measured, and it judges whether the inside of front window glass tend to bloom cloudy, or it is hard to bloom cloudy (step S21). When this judgment result is NO, a compressor judging flag is turned off in order to judge that the inside of front window glass cannot bloom cloudy easily and to lower the operating ratio of a compressor (step S22). (CFLAG=0) It escapes from the routine of drawing 15 after that. Moreover, when the judgment result of step S21 is YES, it judges that the inside of front window glass tends to bloom cloudy, and the compressor judging flag which turns on the electromagnetic clutch of a compressor is turned on (step S23). (CFLAG=1)

[0071] therefore, with this operation gestalt, as antifog control which performs effectively prevention or removal of the cloudiness of the inside of front window glass When judging with the detection value (after [amendment] humidity) and antifog decision value (specific humidity at saturation) of a humidity sensor 76 being compared, and it being easy to bloom cloudy The air which turns on a compressor and blows off to the vehicle interior of a room by the evaporator 41 is dehumidified. By spraying this warm air that was dehumidified and was reheated with the heater core 42 on the inside of front window glass from the outlet of the DrDEF outlet 20 and PaDEF outlet 30 grade, window temperature is raised and cloudy prevention or removal accomplishes.

[0072] Next, with this operation gestalt, since the variable-capacity mold compressor is used, after [target Eve] temperature (TEO) is calculated in order to control the discharging volume of a compressor (step S24). With this operation gestalt, it is made to carry out by the neuro-control for computing the after [target Eve] temperature which showed the operation of after [target Eve] temperature (TEO) to drawing 8 (b) or drawing 9 (d), and drawing 11 . In addition, since it is the same as that of the neuro-control for computing window temperature, and abbreviation, detailed explanation is omitted. At this time, the outside air temperature (TAM) which is the detection value of the near [crew] relative humidity (after [amendment] humidity) and the outside-air-temperature sensor 72 for which it asked at step S17 is used as input data of neuro-control the near [a window] relative humidity for which it asked at step S18, and whenever [target blow-off temperature / for which it asked by step S4] (TAO). When the relative humidity which was difficult in the Prior art rises to near the threshold value of aperture cloudiness by using such neuro-control, complicated control of gathering the operating ratio

of a compressor rapidly can be performed easily.
[0073] Next, after determining after [target Eve] temperature (TEO) as mentioned above, the target discharging volume of a compressor is determined in feedback control (PI control) so that the actual after [Eve] temperature (TE) which is the detection value of the after [Eve] temperature sensor 74, and after [target Eve] temperature (TEO) may be in agreement (step S25). It escapes from the routine of drawing 15 after that. the electromagnetism of the electromagnetic capacity control valve specifically attached to the compressor -- the solenoid current (control current: In) used as the desired value of the control current supplied to a solenoid is calculated based on the several 10 following formula and several 11 formula.
[Equation 10]
$$En = TE - TEO$$

[Equation 11]
$$In = In\text{-}1 - Kp \{ (En - En\text{-}1) + (\theta / Ti) \times En$$

[0074] TE is the actual after [Eve] temperature which is the detection value of the after [Eve] temperature sensor 74 here. TEO is the after [target Eve] temperature searched for at step S23, and Kp is a proportionality constant (for example, 0.03). In the temperature anomaly of this time [En], it is the temperature anomaly (degree C) of last time [1 / En-], and theta is the sampling time (for example, for 1 second), and In-1 is [Ti is an integration constant (for example 1000), and / it is the control current (A) of this time / In / and] the last control current (A).
[0075] The MODE circuit changing switch 57 prepared on the air-conditioner control panel 51 is pushed, and when a manual setup of outlet Mohd was carried out at F/D Mohd, or the DEF switch 54 which prepared on the air-conditioner control panel 51 is pushed and a manual setup of outlet Mohd is carried out at DEF Mohd, a compressor judging flag is turned on compulsorily (CFLAG=1), the electromagnetic clutch of a compressor is turned on, and you may make it control the operating ratio (discharging volume) of a compressor as mentioned above here.
[0076] [Effectiveness of the 1st operation gestalt] Near [crew] relative humidity is lowered like this operation gestalt as mentioned above by cooling the air-conditioning wind which blows off to the vehicle interior of a room, in case an evaporator 41 is passed. In the air conditioner for cars which controlled the operating ratio (discharging volume) of the capacity good transformation compressor which works so that it may dehumidify according to the detection value of a humidity sensor 76 The detection value of the humidity sensor 76 which detects a value lower than actual near [crew] relative humidity so that actual near [crew] relative humidity may be approached By for example, the thing amended [as shown in the property Fig. of drawing 17 (a),] so that there are many counts (count of DEF actuation) on which crew pushed the DEF switch 54 until now, and a humidity sensor appearance value (after [amendment] humidity) may become high According to the comparison result of the humidity after the amendment, and absolute humidity, by controlling the operating ratio of a compressor, even when the large low cost humidity sensor 76 with error is used, fog resistance ability with a high precision can be obtained.
[0077] Moreover, the detection value of the humidity sensor 76 which detects a value higher than actual near [crew] relative humidity so that actual near [crew] relative humidity may be approached By for example, the thing amended [as shown in the property Fig. of drawing 17 (b),] so that there are many counts (count of IG-ON) to which crew turned on the ignition switch until now, and a humidity sensor appearance value (after [amendment] humidity) may become low According to the comparison result of the humidity after the amendment, and absolute humidity, by controlling the operating ratio or discharging volume of a compressor, also when the cheap humidity sensor 76 with a large error is used, the air conditioner [low cost / in comparison] for cars which can obtain high fog resistance ability can be offered.
[0078] Therefore, even when the large humidity sensor 76 with error is used, high fog resistance ability can be obtained by judging correctly whether the inside of front window glass tend to bloom cloudy, and

performing antifog control by using as a humidity value of antifog control of the humidity after amendment which amended the detection value of a humidity sensor 76 by learning actuation of the past crew. Moreover, the operating ratio or discharging volume of a compressor can be reduced by preventing that judge correctly the difficulty of blooming cloudy of the inside of front window glass, and a compressor is started vainly. Since the load of the engine which drives a compressor is reduced by this, it becomes low fuel consumption.

[0079] In addition, you may make it amend it so that window temperature may become low, so that window temperature (dew point temperature of front window glass) required in order to calculate specific humidity at saturation RHW also has many counts (count of DEF actuation) on which crew pushed the DEF switch 54 until now, as shown in the property Fig. of drawing 18 . Moreover, you may make it raise whenever [blow-off temperature / of the air-conditioning style / which you may make it change outlet Mohd into F/D Mohd or DEF Mohd from FOOT Mohd, or also sprays a twist on the inside of front window glass till then], without turning on a compressor, if judged with the inside of front window glass blooming cloudy as antifog control.

[0080] The [2nd operation gestalt] Drawing 19 thru/or drawing 21 are what showed the 2nd operation gestalt of this invention, drawing 19 (a) - (c) and drawing 20 are drawings having shown the membership function used for the fuzzy control of window temperature, and drawing 21 (a) - (e) is drawing having shown the fuzzy rule used for the fuzzy control of window temperature. However, f (vehicle speed) of drawing 20 is the function of the vehicle speed.

[0081] With this operation gestalt, fuzzy control is used as the operation approach of a window temperature presumption means to presume window temperature. The vehicle speed (travel speed) SPD which is the intensity of radiation (solar intensity) TS which is the detection value of bashful ** (room temperature) TR which is the detection value of the bashful ** sensor 71, and the intensity-of-radiation sensor 73 as input data of this fuzzy control, and the detection value of a speed sensor 77 is used.

[0082] For example, for 25 degrees C and intensity of radiation, bashful ** of the estimate (operation value) of the window temperature at the time of being 50 km/h is [500 W/m2 and outside air temperature / -10 degrees C and the vehicle speed] as follows. In this case f (vehicle speed) is 0.75 from the membership function which showed the window temperature goodness of fit of "strong" intensity of radiation to 1.0 and drawing 20 from the membership function which showed the window temperature goodness of fit of "warm" bashful ** to 1.0 and drawing 19 (b) from the membership function shown in drawing 19 (a). The window temperature goodness of fit of 0.5 and "a little cold" outside-air-temperature xf (vehicle speed) of the window temperature goodness of fit of "cold" outside-air-temperature xf (vehicle speed) is 0.5 from the membership function shown in drawing 19 (c). And window temperature can calculate like the several 12 following formula from drawing 19 and the membership function of drawing 20 , and the fuzzy rule of drawing 21 (a) - (e) (algebra product addition method of elastic center).

[Equation 12]

$$(1.0\times1.0\times0.5\times13+1.0\times1.0\times0.5\times18)$$

$$/\,(1.0\times1.0\times0.5+1.0\times1.0\times0.5)\fallingdotseq15.5\ (℃)$$

[0083] For example, for 15 degrees C and intensity of radiation, bashful ** of the estimate (operation value) of the window temperature at the time of being 20 km/h is [0 W/m2 and outside air temperature / -5 degrees C and the vehicle speed] as follows. In this case Drawing 19 f (vehicle speed) is 0.5 from the membership function which showed the window temperature goodness of fit of "weak" intensity of radiation to 1.0 and drawing 20 from the membership function which showed the window temperature goodness of fit of "a little warm" bashful ** to 1.0 and drawing 19 (b) from the membership function shown in (a). The window temperature goodness of fit of 0.5 and "a little warm" outside-air-temperature xf (vehicle speed) of the window temperature goodness of fit of "a little cold" outside-air-temperature xf (vehicle speed) is 0.5 from the membership function shown in drawing 19 (c). And window temperature can calculate like the several 13 following formula from drawing 19 and the membership function of drawing 20 , and the fuzzy rule of drawing 21 (a) - (e) (algebra product addition method of elastic

center).
[Equation 13]
(1. 0×1. 0×0. 5×7+1. 0×1. 0×0. 5×11)
／(1. 0×1. 0×0. 5+1. 0×1. 0×0. 5)≒9. 0 (℃)

[0084] The [3rd operation gestalt] Drawing 22 and drawing 23 are what showed the 3rd operation gestalt of this invention, drawing 22 (a) - (c) is drawing having shown the membership function used for the fuzzy control of after [target Eve] temperature, and drawing 23 (a) - (e) is drawing having shown the fuzzy rule used for the fuzzy control of after [target Eve] temperature.
[0085] With this operation gestalt, it is made to compute after [target Eve] temperature (TEO) with the fuzzy control of after [target Eve] temperature. As input data of the fuzzy control of after [this target Eve] temperature, the outside air temperature (TAM) which is the detection value of whenever [near / a near / crew / relative humidity-window / relative humidity and target blow-off temperature], and (TAO) the outside-air-temperature sensor 72 is used. In addition, since explanation of fuzzy control is the same as that of the 2nd operation gestalt and abbreviation, explanation is omitted. Thereby, in a Prior art, when the difficult near [crew] relative humidity rises to near the limitation of aperture cloudiness, complicated control of gathering the operating ratio of a compressor rapidly can be performed easily.
[0086] The [4th operation gestalt] Drawing 24 and drawing 25 are the flow charts which showed the outlet modal control based on the humidity sensor appearance value are what showed the 4th operation gestalt of this invention, and according [drawing 24] to Air-conditioner ECU, and drawing 25 is the property Fig. having shown the outlet Mohd control characteristic over the humidity after amendment.
[0087] With this operation gestalt, if it goes into outlet Mohd decision control in step S6 of drawing 5 , the routine of drawing 24 will be started and it will judge first whether it is AUTO (step S31). When this judgment result is NO, outlet Mohd is assigned to DEF Mohd set up by assigning outlet Mohd to FACE Mohd set up by operating the MODE circuit changing switch 57, B/L Mohd, FOOT Mohd, or F/D Mohd, or pushing the DEF switch 54 (step S32). After that, it escapes from the routine of drawing 24 and control processing after step S7 of drawing 5 is performed.
[0088] Moreover, when the judgment result of step S31 is YES, based on TAO (Dr), TAO (Pa), and the outlet Mohd property over whenever [target blow-off temperature / which was shown in the property Fig. of drawing 9], each outlet Mohd of a drivers side air-conditioning zone and a passenger side air-conditioning zone is determined whenever [target blow-off temperature / which was called for by step S4 of drawing 5] (step S33). Next, outlet Mohd who determined at step S33 judges whether you are FOOT Mohd (step S34). When this judgment result is NO, outlet Mohd is set as FACE Mohd or B/L Mohd (step S35). After that, it escapes from the routine of drawing 24 and control processing after step S7 of drawing 5 is performed.
[0089] Moreover, when the judgment result of step S34 is YES, the near [crew] relative humidity (after [amendment] humidity called for with the 1st operation gestalt) which is the detection value of a humidity sensor 76, bashful ** which is the detection value of the bashful ** sensor 71, and the absolute humidity Hr of the empty vehicle interior of a room are calculated (step S36). Next, specific humidity at saturation Hw is calculated from the window temperature (TWG) presumed with the 1st operation gestalt (step S37).
[0090] Next, it judges whether the absolute humidity Hr of the vehicle interior of a room and the specific humidity at saturation Hw as an antifog decision value are measured, and the inside of front window glass tend to bloom cloudy (step S38). Since it can judge that the inside of front window glass tends to bloom cloudy when this judgment result is YES (i.e., when it is Hr-Hw>=alpha), as shown in the property Fig. of drawing 25 , outlet Mohd is set as F/D Mohd (step S39). After that, it escapes from the routine of drawing 24 and control processing after step S7 of drawing 5 is performed. At this time, a compressor judging flag may be turned on (CFLAG=1) and the amount of open air installation may be made [many].
[0091] Moreover, since it can judge that the inside of front window glass cannot bloom cloudy easily when the judgment result of step S38 is NO (i.e., when it is Hr-Hw<alpha), as shown in the property

Fig. of drawing 25 , outlet Mohd is set as FOOT Mohd (step S40). After that, it escapes from the routine of drawing 24 and control processing after step S7 of drawing 5 is performed. At this time, a compressor judging flag may be turned off (CFLAG=O), it may turn on (CFLAG=1), or whichever is sufficient. Moreover, the amount of open air installation may be lessened.

[0092] The [5th operation gestalt] Drawing 26 thru/or drawing 28 are drawings having shown the humidity correction factor property of as opposed to [are the flow chart which showed the antifog control based on the humidity sensor appearance value are what showed the 5th operation gestalt of this invention and according / drawing 26 / to Air-conditioner ECU, and] whenever [target blow-off temperature] in drawing 27 , and drawing 28 is drawing having shown the after [target Eve] temperature characteristic over whenever [target blow-off temperature].

[0093] Various kinds of sensors which detect the air-conditioning thermal load of the vehicle interior of a room with this operation gestalt (for example, based on the bashful ** sensor 71, the outside-air-temperature sensor 72, the detection value of a sun sensor 73, and the laying temperature of a room temperature setter (for example, the drivers side temperature configuration switch 62, passenger side temperature configuration-switch 63 grade), TAO is calculated whenever [target blow-off temperature] (step S41).) (decision) Next, the detection value (after [amendment] humidity) of a humidity sensor 76 is computed by performing control processing and data processing of steps S11-S17 of drawing 1 (step S42).

[0094] Based on bashful ** (TR) which are the detection value (after [amendment] humidity) of the humidity sensor 76 for which it asked at step S42, and the detection value of the bashful ** sensor 71, humidity correction is performed to TAO whenever [target blow-off temperature / for which it asked at step S41]. At step S41, from the property Fig. of drawing 27 , the relative humidity of 25 degrees C (RH25) is calculated by the several 14 following formula, and, specifically, humidity correction value f (RH25) is calculated by the several 15 following formula based on this RH25 (step S43). (decision)

[Equation 14]

$$RH25 = f(TR) \times RH / 60$$

However, RH is the detection value (after [amendment] humidity) of a humidity sensor 76, and f (TR) is the function (humidity correction value) of bashful ** TR.

[Equation 15]

$$f(RH25) = (RH25 - 60) \times 0.15$$

However, RH is the detection value (after [amendment] humidity) of a humidity sensor 76, and TR is the detection value of the bashful ** sensor 71, at the time of RH 25<=30, it sets to RH 25= 30, and is taken as RH 25= 90 at the time of RH 25>=90.

[0095] Next, based on the humidity correction value f (RH25) calculated at TAO and step S42 whenever [target blow-off temperature / for which it asked at step S41], whenever [air-conditioning eye-of-the-wind label Eve blow-off temperature / which blows off from an evaporator 41 by the several 16 following formula] (after [target Eve] temperature: TEO) is calculated (step S44). (decision)

[Equation 16]

$$TEO = f(TAO) - f(RH25)$$

However, f (TAO) can be found from the property Fig. of drawing 28 .

[0096] Next, the target discharging volume of a compressor is determined in feedback control (PI control) so that the actual after [Eve] temperature (TE) which is the detection value of the after [Eve] temperature sensor 74, and after [target Eve] temperature (TEO) may be in agreement (step S45). It escapes from the routine of drawing 26 after that.

[0097] Operation gestalt] besides [Although the detection value of the sensor of humidity sensor 76 grade used for antifog control was amended with the 1st operation gestalt according to the count of DEF switch actuation, the count of IG-ON, or the control change request Front window glass is warmed using heating means, such as heating wire, and you may make it amend the detection value of the sensor of

humidity sensor 76 grade used for antifog control according to the count of actuation of the switch which dispels aperture cloudiness.
[0098] Although the humidity sensor 76 was used with the 1st operation gestalt as a means to presume the cloudy (aperture cloudiness) easy one of the inside of front window glass, the sensor which detects dew condensation, the front window transmittance, or front window temperature of a front window as a means to presume the cloudy (aperture cloudiness) easy one of the inside of front window glass may be used.
[0099] Although near [crew] relative humidity or window temperature was amended with the 1st operation gestalt according to crew's actuation, past control change request, or past air-conditioning operating time The control characteristic of the means which has effectiveness in other aperture cloudiness removal or prevention, for example, the compressor control which can lower relative humidity, Or you may make it amend the control characteristic of control according to actuation of the past crew or a control change request whenever [control characteristic / of the DEF air-flow rate control which controls the blow-off airflow of the air-conditioning style from Dr and the PaDEF outlets 20 and 30 /, and DEF blow-off temperature]. In this case, the same effectiveness as the 1st operation gestalt can be acquired.
[0100] if those who anyone operate the DEF switch 54 one to twice , or surely operate it in human engineering although the amount of amendments be calculated by the linearity formula in the 1st operation gestalt be -- etc. -- if reflect in antifog control , in order to except inconvenient actuation , it may make raise the amendment precision of a sensor appearance value by use neuro-control or fuzzy control and presume a DEF actuation inclination
[0101] With the 1st operation gestalt, although reflection to antifog control of actuation of crews, such as a count of DEF actuation or a count of IG-ON (engine count of starting), was performed instancy, the fault by the operation mistake can also be prevented by making it make actuation of crew reflect in antifog control, after predetermined time (for example, for 5 seconds) passes. Moreover, while it is realizable to become the antifog control suitable for a user by establishing vision display means (for example, a display 52, a warning lamp, etc.) to tell crew about the control characteristic of a humidity sensor appearance value or antifog control being amended, and acoustic-sense display means (a buzzer, voice, etc.), when a manufacturer collects later, the amount of gaps with the first tuning can be checked. Thereby, added value increases by the amount of gaps being made to design data.
[0102] it is better to be made to amend by separating the error of the detection value of a humidity sensor 76, and the error of the estimate of window temperature, being alike, respectively and receiving, in order to carry out antifog control to accuracy more although antifog control which only amends the detection value of a humidity sensor 76 by the count of DEF actuation, and controls the operating ratio of a compressor by the 1st operation gestalt was carried out. Here, if window glass is damp to rain in case of rainy weather, the experiment shows that the temperature (window temperature) of front window glass becomes almost equal to outside air temperature. Therefore, if that it is rainy weather can presume or detect, window temperature will be using the outside air temperature (TAM) which is the detection value of the outside-air-temperature sensor 72, and an error will hardly produce it.
[0103] Therefore, it will have detected that the DEF switch 54 was operated in case of rainy weather lowness rather than relative humidity with an actual humidity sensor 76. In this case, if the detection value of a humidity sensor 76 is amended, it turns out that exact antifog control can be performed. Therefore, the optimal amount of humidity sensor amendments can be more correctly obtained by amending the detection value of a humidity sensor 76 more highly, so that the count which also judged the control which has amended the detection value of a humidity sensor 76 more highly to be rainy weather with progress of air-conditioning operating time increases. For example, when the time of rainy weather is detected 20 times, it is desirable to judge that amendment of the detection value of a humidity sensor was fully performed, and to start amendment of the error of a window temperature detection (presumption) means.
[0104] Moreover, window temperature is raised [progress / of air-conditioning operating time] for example, with the count of IG-ON, and it raises until crew pushes the DEF switch 54. Although window

presumption temperature will be low amended if crew pushes the DEF switch 54, window temperature is presumed with many parameters, such as bashful **, outside air temperature, the vehicle speed, and intensity of radiation. Therefore, a judgment is difficult in of which parameter the contribution has made a mistake in window temperature as the flume amended low.

[0105] Therefore, when each parameter is which value, amendment of window temperature is easily attained by using the neuro-control or fuzzy control which can plot whether window presumption temperature was wrong. Complicated window temperature can be easily presumed by tuning up window temperature presumption at the time of car sale by plot also in the car tuning phase for making it as the optimal as possible using neuro-control or fuzzy control besides the window temperature compensation using such learning control.

[0106] Although a humidity sensor 76 is held with the bashful ** sensor 71 in the hollow of the front face of an instrument panel 50, crew side relative humidity is detected and near [a window] relative humidity is computed from window temperature and near [crew] relative humidity (after [amendment] humidity) with this operation gestalt, a humidity sensor 76 detects crew side relative humidity, and you may make it the humidity sensor which carried out additional installation detect near [a window] relative humidity near a front window.

[0107] Although this operation gestalt explained the example using the variable-capacity mold compressor which has an electromagnetic capacity adjustable valve as a compressor, the compressor by which ON/OFF is carried out with an electromagnetic clutch as a compressor, or the electromotive compressor driven by the motor may be used. Moreover, both a FACE outlet and a FOOT outlet may be opened and closed by one outlet Mohd change door. Furthermore, the capacitor (heat exchanger for heating) of a refrigerating cycle may be installed instead of the heater core 42.

[Translation done.]

* NOTICES *

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the air conditioner for cars which can obtain high fog resistance ability also by the large low cost humidity sensor of especially an error about the air conditioner for cars which performs antifog control of a window according to the detection value of a humidity sensor.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Conventionally, the air conditioner for cars brings crew a comfortable environment in all climates and transit conditions, prevents aperture cloudiness or with frost, or performs removal of aperture cloudiness or frost, secures an operator's field of view, and aims at enabling safe and comfortable operation.
[0003] Conventionally, it sets to JP,8-85336,A. When judging that it asks for the absolute humidity of the detection value empty vehicle interior of a room of the humidity sensor of the vehicle interior of a room, and a windowpane tends to bloom cloudy based on the comparison result of this absolute humidity and the specific humidity at saturation in a windowpane Control so that the amount of open air installation is made [many] and a windowpane does not bloom cloudy, and the amount of open air installation is lessened so that a compressor will not consume power vainly, if it judges that a windowpane cannot bloom cloudy easily. The air conditioner for cars currently controlled to reduce the operating ratio of a compressor and to be able to improve fuel consumption is proposed. Moreover, in order to carry out above-mentioned antifog control correctly, the very small humidity sensor with error is used for this air conditioner for cars.

[Translation done.]

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EFFECT OF THE INVENTION

[Effectiveness of the 1st operation gestalt] Near [crew] relative humidity is lowered like this operation gestalt as mentioned above by cooling the air-conditioning wind which blows off to the vehicle interior of a room, in case an evaporator 41 is passed. In the air conditioner for cars which controlled the operating ratio (discharging volume) of the capacity good transformation compressor which works so that it may dehumidify according to the detection value of a humidity sensor 76 The detection value of the humidity sensor 76 which detects a value lower than actual near [crew] relative humidity so that actual near [crew] relative humidity may be approached By for example, the thing amended [as shown in the property Fig. of drawing 17 (a),] so that there are many counts (count of DEF actuation) on which crew pushed the DEF switch 54 until now, and a humidity sensor appearance value (after [amendment] humidity) may become high According to the comparison result of the humidity after the amendment, and absolute humidity, by controlling the operating ratio of a compressor, even when the large low cost humidity sensor 76 with error is used, fog resistance ability with a high precision can be obtained.
[0077] Moreover, the detection value of the humidity sensor 76 which detects a value higher than actual near [crew] relative humidity so that actual near [crew] relative humidity may be approached By for example, the thing amended [as shown in the property Fig. of drawing 17 (b),] so that there are many counts (count of IG-ON) to which crew turned on the ignition switch until now, and a humidity sensor appearance value (after [amendment] humidity) may become low According to the comparison result of the humidity after the amendment, and absolute humidity, by controlling the operating ratio or discharging volume of a compressor, also when the cheap humidity sensor 76 with a large error is used, the air conditioner [low cost / in comparison] for cars which can obtain high fog resistance ability can be offered.
[0078] Therefore, even when the large humidity sensor 76 with error is used, high fog resistance ability can be obtained by judging correctly whether the inside of front window glass tend to bloom cloudy, and performing antifog control by using as a humidity value of antifog control of the humidity after amendment which amended the detection value of a humidity sensor 76 by learning actuation of the past crew. Moreover, the operating ratio or discharging volume of a compressor can be reduced by preventing that judge correctly the difficulty of blooming cloudy of the inside of front window glass, and a compressor is started vainly. Since the load of the engine which drives a compressor is reduced by this, it becomes low fuel consumption.
[0079] In addition, you may make it amend it so that window temperature may become low, so that window temperature (dew point temperature of front window glass) required in order to calculate specific humidity at saturation RHW also has many counts (count of DEF actuation) on which crew pushed the DEF switch 54 until now, as shown in the property Fig. of drawing 18 . Moreover, you may make it raise whenever [blow-off temperature / of the air-conditioning style / which you may make it change outlet Mohd into F/D Mohd or DEF Mohd from FOOT Mohd, or also sprays a twist on the inside of front window glass till then], without turning on a compressor, if judged with the inside of front window glass blooming cloudy as antifog control.
[0080] The [2nd operation gestalt] Drawing 19 thru/or drawing 21 are what showed the 2nd operation

gestalt of this invention, drawing 19 (a) - (c) and drawing 20 are drawings having shown the membership function used for the fuzzy control of window temperature, and drawing 21 (a) - (e) is drawing having shown the fuzzy rule used for the fuzzy control of window temperature. However, f (vehicle speed) of drawing 20 is the function of the vehicle speed.

[0081] With this operation gestalt, fuzzy control is used as the operation approach of a window temperature presumption means to presume window temperature. The vehicle speed (travel speed) SPD which is the intensity of radiation (solar intensity) TS which is the detection value of bashful ** (room temperature) TR which is the detection value of the bashful ** sensor 71, and the intensity-of-radiation sensor 73 as input data of this fuzzy control, and the detection value of a speed sensor 77 is used.

[0082] For example, for 25 degrees C and intensity of radiation, bashful ** of the estimate (operation value) of the window temperature at the time of being 50 km/h is [500 W/m2 and outside air temperature / -10 degrees C and the vehicle speed] as follows. In this case f (vehicle speed) is 0.75 from the membership function which showed the window temperature goodness of fit of "strong" intensity of radiation to 1.0 and drawing 20 from the membership function which showed the window temperature goodness of fit of "warm" bashful ** to 1.0 and drawing 19 (b) from the membership function shown in drawing 19 (a). The window temperature goodness of fit of 0.5 and "a little cold" outside-air-temperature xf (vehicle speed) of the window temperature goodness of fit of "cold" outside-air-temperature xf (vehicle speed) is 0.5 from the membership function shown in drawing 19 (c). And window temperature can calculate like the several 12 following formula from drawing 19 and the membership function of drawing 20 , and the fuzzy rule of drawing 21 (a) - (e) (algebra product addition method of elastic center).

[Equation 12]

$$(1.0\times1.0\times0.5\times13+1.0\times1.0\times0.5\times18)$$

$$/(1.0\times1.0\times0.5+1.0\times1.0\times0.5)\fallingdotseq15.5\ (℃)$$

[0083] For example, for 15 degrees C and intensity of radiation, bashful ** of the estimate (operation value) of the window temperature at the time of being 20 km/h is [0 W/m2 and outside air temperature / -5 degrees C and the vehicle speed] as follows. In this case Drawing 19 f (vehicle speed) is 0.5 from the membership function which showed the window temperature goodness of fit of "weak" intensity of radiation to 1.0 and drawing 20 from the membership function which showed the window temperature goodness of fit of "a little warm" bashful ** to 1.0 and drawing 19 (b) from the membership function shown in (a). The window temperature goodness of fit of 0.5 and "a little warm" outside-air-temperature xf (vehicle speed) of the window temperature goodness of fit of "a little cold" outside-air-temperature xf (vehicle speed) is 0.5 from the membership function shown in drawing 19 (c). And window temperature can calculate like the several 13 following formula from drawing 19 and the membership function of drawing 20 , and the fuzzy rule of drawing 21 (a) - (e) (algebra product addition method of elastic center).

[Equation 13]

$$(1.0\times1.0\times0.5\times7+1.0\times1.0\times0.5\times11)$$

$$/(1.0\times1.0\times0.5+1.0\times1.0\times0.5)\fallingdotseq9.0\ (℃)$$

[0084] The [3rd operation gestalt] Drawing 22 and drawing 23 are what showed the 3rd operation gestalt of this invention, drawing 22 (a) - (c) is drawing having shown the membership function used for the fuzzy control of after [target Eve] temperature, and drawing 23 (a) - (e) is drawing having shown the fuzzy rule used for the fuzzy control of after [target Eve] temperature.

[0085] With this operation gestalt, it is made to compute after [target Eve] temperature (TEO) with the fuzzy control of after [target Eve] temperature. As input data of the fuzzy control of after [this target Eve] temperature, the outside air temperature (TAM) which is the detection value of whenever [near / a near / crew / relative humidity-window / relative humidity and target blow-off temperature], and (TAO) the outside-air-temperature sensor 72 is used. In addition, since explanation of fuzzy control is the same as that of the 2nd operation gestalt and abbreviation, explanation is omitted. Thereby, in a Prior art,

when the difficult near [crew] relative humidity rises to near the limitation of aperture cloudiness, complicated control of gathering the operating ratio of a compressor rapidly can be performed easily.
[0086] The [4th operation gestalt] Drawing 24 and drawing 25 are the flow charts which showed the outlet modal control based on the humidity sensor appearance value are what showed the 4th operation gestalt of this invention, and according [drawing 24] to Air-conditioner ECU, and drawing 25 is the property Fig. having shown the outlet Mohd control characteristic over the humidity after amendment.
[0087] With this operation gestalt, if it goes into outlet Mohd decision control in step S6 of drawing 5 , the routine of drawing 24 will be started and it will judge first whether it is AUTO (step S31). When this judgment result is NO, outlet Mohd is assigned to DEF Mohd set up by assigning outlet Mohd to FACE Mohd set up by operating the MODE circuit changing switch 57, B/L Mohd, FOOT Mohd, or F/D Mohd, or pushing the DEF switch 54 (step S32). After that, it escapes from the routine of drawing 24 and control processing after step S7 of drawing 5 is performed.
[0088] Moreover, when the judgment result of step S31 is YES, based on TAO (Dr), TAO (Pa), and the outlet Mohd property over whenever [target blow-off temperature / which was shown in the property Fig. of drawing 9], each outlet Mohd of a drivers side air-conditioning zone and a passenger side air-conditioning zone is determined whenever [target blow-off temperature / which was called for by step S4 of drawing 5] (step S33). Next, outlet Mohd who determined at step S33 judges whether you are FOOT Mohd (step S34). When this judgment result is NO, outlet Mohd is set as FACE Mohd or B/L Mohd (step S35). After that, it escapes from the routine of drawing 24 and control processing after step S7 of drawing 5 is performed.
[0089] Moreover, when the judgment result of step S34 is YES, the near [crew] relative humidity (after [amendment] humidity called for with the 1st operation gestalt) which is the detection value of a humidity sensor 76, bashful ** which is the detection value of the bashful ** sensor 71, and the absolute humidity Hr of the empty vehicle interior of a room are calculated (step S36). Next, specific humidity at saturation Hw is calculated from the window temperature (TWG) presumed with the 1st operation gestalt (step S37).
[0090] Next, it judges whether the absolute humidity Hr of the vehicle interior of a room and the specific humidity at saturation Hw as an antifog decision value are measured, and the inside of front window glass tend to bloom cloudy (step S38). Since it can judge that the inside of front window glass tends to bloom cloudy when this judgment result is YES (i.e., when it is Hr-Hw>=alpha), as shown in the property Fig. of drawing 25 , outlet Mohd is set as F/D Mohd (step S39). After that, it escapes from the routine of drawing 24 and control processing after step S7 of drawing 5 is performed. At this time, a compressor judging flag may be turned on (CFLAG=1) and the amount of open air installation may be made [many].
[0091] Moreover, since it can judge that the inside of front window glass cannot bloom cloudy easily when the judgment result of step S38 is NO (i.e., when it is Hr-Hw<alpha), as shown in the property Fig. of drawing 25 , outlet Mohd is set as FOOT Mohd (step S40). After that, it escapes from the routine of drawing 24 and control processing after step S7 of drawing 5 is performed. At this time, a compressor judging flag may be turned off (CFLAG=O), it may turn on (CFLAG=1), or whichever is sufficient. Moreover, the amount of open air installation may be lessened.
[0092] The [5th operation gestalt] Drawing 26 thru/or drawing 28 are drawings having shown the humidity correction factor property of as opposed to [are the flow chart which showed the antifog control based on the humidity sensor appearance value are what showed the 5th operation gestalt of this invention and according / drawing 26 / to Air-conditioner ECU, and] whenever [target blow-off temperature] in drawing 27 , and drawing 28 is drawing having shown the after [target Eve] temperature characteristic over whenever [target blow-off temperature].
[0093] Various kinds of sensors which detect the air-conditioning thermal load of the vehicle interior of a room with this operation gestalt (for example, based on the bashful ** sensor 71, the outside-air-temperature sensor 72, the detection value of a sun sensor 73, and the laying temperature of a room temperature setter (for example, the drivers side temperature configuration switch 62, passenger side temperature configuration-switch 63 grade), TAO is calculated whenever [target blow-off temperature]

(step S41).) (decision) Next, the detection value (after [amendment] humidity) of a humidity sensor 76 is computed by performing control processing and data processing of steps S11-S17 of drawing 1 (step S42).

[0094] Based on bashful ** (TR) which are the detection value (after [amendment] humidity) of the humidity sensor 76 for which it asked at step S42, and the detection value of the bashful ** sensor 71, humidity correction is performed to TAO whenever [target blow-off temperature / for which it asked at step S41]. At step S41, from the property Fig. of drawing 27 , the relative humidity of 25 degrees C (RH25) is calculated by the several 14 following formula, and, specifically, humidity correction value f (RH25) is calculated by the several 15 following formula based on this RH25 (step S43). (decision)

[Equation 14]

$$RH25 = f(TR) \times RH / 60$$

However, RH is the detection value (after [amendment] humidity) of a humidity sensor 76, and f (TR) is the function (humidity correction value) of bashful ** TR.

[Equation 15]

$$f(RH25) = (RH25 - 60) \times 0.15$$

However, RH is the detection value (after [amendment] humidity) of a humidity sensor 76, and TR is the detection value of the bashful ** sensor 71, at the time of RH 25<=30, it sets to RH 25= 30, and is taken as RH 25= 90 at the time of RH 25>=90.

[0095] Next, based on the humidity correction value f (RH25) calculated at TAO and step S42 whenever [target blow-off temperature / for which it asked at step S41], whenever [air-conditioning eye-of-the-wind label Eve blow-off temperature / which blows off from an evaporator 41 by the several 16 following formula] (after [target Eve] temperature: TEO) is calculated (step S44). (decision)

[Equation 16]

$$TEO = f(TAO) - f(RH25)$$

However, f (TAO) can be found from the property Fig. of drawing 28 .

[0096] Next, the target discharging volume of a compressor is determined in feedback control (PI control) so that the actual after [Eve] temperature (TE) which is the detection value of the after [Eve] temperature sensor 74, and after [target Eve] temperature (TEO) may be in agreement (step S45). It escapes from the routine of drawing 26 after that.

[0097] Operation gestalt] besides [Although the detection value of the sensor of humidity sensor 76 grade used for antifog control was amended with the 1st operation gestalt according to the count of DEF switch actuation, the count of IG-ON, or the control change request Front window glass is warmed using heating means, such as heating wire, and you may make it amend the detection value of the sensor of humidity sensor 76 grade used for antifog control according to the count of actuation of the switch which dispels aperture cloudiness.

[0098] Although the humidity sensor 76 was used with the 1st operation gestalt as a means to presume the cloudy (aperture cloudiness) easy one of the inside of front window glass, the sensor which detects dew condensation, the front window transmittance, or front window temperature of a front window as a means to presume the cloudy (aperture cloudiness) easy one of the inside of front window glass may be used.

[0099] Although near [crew] relative humidity or window temperature was amended with the 1st operation gestalt according to crew's actuation, past control change request, or past air-conditioning operating time The control characteristic of the means which has effectiveness in other aperture cloudiness removal or prevention, for example, the compressor control which can lower relative humidity, Or you may make it amend the control characteristic of control according to actuation of the past crew or a control change request whenever [control characteristic / of the DEF air-flow rate control which controls the blow-off airflow of the air-conditioning style from Dr and the PaDEF outlets 20 and 30 /, and DEF blow-off temperature]. In this case, the same effectiveness as the 1st operation gestalt can

be acquired.
[0100] if those who anyone operate the DEF switch 54 one to twice , or surely operate it in human engineering although the amount of amendments be calculated by the linearity formula in the 1st operation gestalt be -- etc. -- if reflect in antifog control , in order to except inconvenient actuation , it may make raise the amendment precision of a sensor appearance value by use neuro-control or fuzzy control and presume a DEF actuation inclination
[0101] With the 1st operation gestalt, although reflection to antifog control of actuation of crews, such as a count of DEF actuation or a count of IG-ON (engine count of starting), was performed instancy, the fault by the operation mistake can also be prevented by making it make actuation of crew reflect in antifog control, after predetermined time (for example, for 5 seconds) passes. Moreover, while it is realizable to become the antifog control suitable for a user by establishing vision display means (for example, a display 52, a warning lamp, etc.) to tell crew about the control characteristic of a humidity sensor appearance value or antifog control being amended, and acoustic-sense display means (a buzzer, voice, etc.), when a manufacturer collects later, the amount of gaps with the first tuning can be checked. Thereby, added value increases by the amount of gaps being made to design data.
[0102] it is better to be made to amend by separating the error of the detection value of a humidity sensor 76, and the error of the estimate of window temperature, being alike, respectively and receiving, in order to carry out antifog control to accuracy more although antifog control which only amends the detection value of a humidity sensor 76 by the count of DEF actuation, and controls the operating ratio of a compressor by the 1st operation gestalt was carried out. Here, if window glass is damp to rain in case of rainy weather, the experiment shows that the temperature (window temperature) of front window glass becomes almost equal to outside air temperature. Therefore, if that it is rainy weather can presume or detect, window temperature will be using the outside air temperature (TAM) which is the detection value of the outside-air-temperature sensor 72, and an error will hardly produce it.
[0103] Therefore, it will have detected that the DEF switch 54 was operated in case of rainy weather lowness rather than relative humidity with an actual humidity sensor 76. In this case, if the detection value of a humidity sensor 76 is amended, it turns out that exact antifog control can be performed. Therefore, the optimal amount of humidity sensor amendments can be more correctly obtained by amending the detection value of a humidity sensor 76 more highly, so that the count which also judged the control which has amended the detection value of a humidity sensor 76 more highly to be rainy weather with progress of air-conditioning operating time increases. For example, when the time of rainy weather is detected 20 times, it is desirable to judge that amendment of the detection value of a humidity sensor was fully performed, and to start amendment of the error of a window temperature detection (presumption) means.
[0104] Moreover, window temperature is raised [progress / of air-conditioning operating time] for example, with the count of IG-ON, and it raises until crew pushes the DEF switch 54. Although window presumption temperature will be low amended if crew pushes the DEF switch 54, window temperature is presumed with many parameters, such as bashful **, outside air temperature, the vehicle speed, and intensity of radiation. Therefore, a judgment is difficult in of which parameter the contribution has made a mistake in window temperature as the flume amended low.
[0105] Therefore, when each parameter is which value, amendment of window temperature is easily attained by using the neuro-control or fuzzy control which can plot whether window presumption temperature was wrong. Complicated window temperature can be easily presumed by tuning up window temperature presumption at the time of car sale by plot also in the car tuning phase for making it as the optimal as possible using neuro-control or fuzzy control besides the window temperature compensation using such learning control.
[0106] Although a humidity sensor 76 is held with the bashful ** sensor 71 in the hollow of the front face of an instrument panel 50, crew side relative humidity is detected and near [a window] relative humidity is computed from window temperature and near [crew] relative humidity (after [amendment] humidity) with this operation gestalt, a humidity sensor 76 detects crew side relative humidity, and you may make it the humidity sensor which carried out additional installation detect near

[a window] relative humidity near a front window.
[0107] Although this operation gestalt explained the example using the variable-capacity mold compressor which has an electromagnetic capacity adjustable valve as a compressor, the compressor by which ON/OFF is carried out with an electromagnetic clutch as a compressor, or the electromotive compressor driven by the motor may be used. Moreover, both a FACE outlet and a FOOT outlet may be opened and closed by one outlet Mohd change door. Furthermore, the capacitor (heat exchanger for heating) of a refrigerating cycle may be installed instead of the heater core 42.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, when a small humidity sensor with error is very high cost, for a certain reason, a certain amount of error cannot perform exact antifog control, but the problem that the cloudiness of a windowpane occurs, or the operating ratio of a compressor increases and fuel consumption gets worse surely has it. Moreover, although window temperature (dew point temperature of window glass) needed to be presumed for exact antifog control, as it was in JP,7-179120,A, there were very many parameters required to presume window temperature correctly like bashful **, outside air temperature, intensity of radiation, or the vehicle speed, and creation of the formula of window temperature was very difficult for them.
[0005]
[Objects of the Invention] Without using the humidity sensor of high cost, the purpose of this invention is amending the control characteristic of antifog control, or the detection value of a humidity sensor by actuation of the past crew or the control change request, and is to offer the air conditioner for cars which can perform removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost with an efficiently or sufficient precision correctly easily by low cost. Moreover, it is in offering the air conditioner for cars which can create the formula of window temperature very easily. Furthermore, even when a cheap humidity sensor with a large error is used, it is in offering the air conditioner [low cost / in comparison] for cars which can raise easily the fog resistance ability which removes prevention, aperture cloudiness, or frost aperture cloudiness or with frost.

[Translation done.]

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MEANS

[Means for Solving the Problem] According to invention according to claim 1, even if an error is large and uses a cheap sensor by learning actuation of the past crew or a control change request, and changing the control characteristic which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost according to the study result, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request.
[0007] According to invention according to claim 2, even if an error is large and uses a cheap sensor by learning actuation of the past crew or a control change request, and amending any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means according to the study result, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request.
[0008] According to invention according to claim 3, even if an error is large and uses a cheap sensor by learning actuation of the past crew or a control change request, and amending the operating ratio of a compressor or a heat exchanger, capacity, or any one or more physical values of the actuation conditions according to the study result, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request.
[0009] According to invention according to claim 4, actuation of the past crew or a control change request is learned. By amending any one or more physical values of the blow-off rate of the air-conditioning style to the airflow or the window of the air-conditioning style to the changing condition or window to outlet Mohd including the blowdown of the air-conditioning style to a window according to the study result Even if an error is large and uses a cheap sensor, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request.
[0010] According to invention according to claim 5, even if an error is large and uses a cheap sensor by learning actuation of the past crew or a control change request, and amending whenever [to a window / blow-off temperature / of the air-conditioning style] according to the study result, high fog resistance ability can be obtained according to actuation of the past crew or the study effectiveness of a control change request. Moreover, according to invention given in either claim 6 or thru/or the claims 8 To the control which has effectiveness in removal of the prevention with a window temperature presumption means, aperture cloudiness, or frost, aperture cloudiness, or frost Optimal antifog control can be easily performed only by plotting on which conditions aperture cloudiness occurred by applying any one or more of fuzzy control or the neuro-control to calculation of the target temperature a heat exchanger or near a heat exchanger. Furthermore, the formula of the target temperature window temperature presumption, a heat exchanger, or near a heat exchanger can be created very easily.
[0011] According to invention given in either claim 9 or thru/or the claims 11 The detection value of a detection means to detect the physical quantity which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, Dew condensation or the window transmittance of humidity or a window, or any one or more detection values of the window temperature detection means, Or the optimal compressor operating ratio can be set up by changing a window temperature presumption means with the parameter which can presume air-conditioning operating time,

and using it for antifog control. Moreover, according to invention according to claim 12, optimal antifog control can be easily performed only by plotting on which conditions aperture cloudiness occurred by using any one or more of fuzzy control or the neuro-control for calculation of the amount of modification, or the amount of amendments. Furthermore, according to invention according to claim 13, it is characterized by actuation of crew or a control change request being the prevention with aperture cloudiness or frost, aperture cloudiness, or the removal means of frost.

[0012] According to invention according to claim 14, a window heating means to heat the foot differential-gear selection means or window which chooses outlet Mohd who includes the blowdown of the air-conditioning style to the defroster selection means or window which chooses the blowdown of the air-conditioning style to a window as the prevention with aperture cloudiness or frost, aperture cloudiness, or a removal means of frost may be used. Moreover, according to invention according to claim 15, reflecting actuation of crew or a control change request can prevent the fault by the operation mistake or the incorrect control change request by carrying out, after carrying out actuation of crew or a control change request and predetermined time passes.

[0013] According to invention according to claim 16, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification, or the amount of amendments [after actuation of crew or a control change request becomes the 1st count of predetermined until actuation of crew or a control change request becomes the 1st count of predetermined]. Moreover, according to invention according to claim 17, after actuation of crew or a control change request becomes the 2nd count of predetermined, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification, or the amount of amendments [before actuation of crew or a control change request becomes the 2nd count of predetermined]. Furthermore, according to invention according to claim 18, crew can realize or check that it is antifog control suitable for crew's air-conditioning feeling by establishing the display means which displays [vision-] or displays [acoustic-sense-] the amount of modification, or the amount of amendments.

[0014] You may make it prepare the modification means or adjustment device in which modification or adjustment is possible for the amount of modification, or the amount of amendments by approaches other than the prevention with aperture cloudiness or frost, aperture cloudiness, or the removal means of frost according to invention according to claim 19. Moreover, you may make it include the coincidence input of two or more input means for the amount of modification, or the amount of amendments at least with approaches other than the prevention with aperture cloudiness or frost, aperture cloudiness, or the removal means of frost according to invention according to claim 20. Furthermore, according to invention according to claim 21, modification or amendment may be made to be performed near the condition actuation of the past crew or a control change request was performed.

[0015] According to invention according to claim 22, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification [after the parameter which can presume air-conditioning operating time reaches the 1st predetermined value until the parameter which can presume air-conditioning operating time reaches the 1st predetermined value]. Moreover, according to invention according to claim 23, after the parameter which can presume air-conditioning operating time reaches beyond the 2nd predetermined value, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification [before the parameter which can presume air-conditioning operating time reaches beyond the 2nd predetermined value]. Furthermore, according to invention according to claim 24, the parameter which can presume air-conditioning operating time is good also as any one or more counts in any one or more elapsed time in after a dc-battery injection, car driving means actuation, air-conditioning actuation, or ventilation actuation, the count of car driving means actuation, the count of ignition-on, the count of accessory power-source ON, or the count of starter-on.

[0016] According to invention according to claim 25, optimal antifog control can be easily performed by computing the conditions which perform modification or amendment or more using any one of fuzzy control or the neuro-control. Moreover, according to invention according to claim 26, one or more of outside air temperature, the vehicle speed, a room temperature, intensity of radiation, or outlet Mohd

may be used as any one or more input data of fuzzy control or the neuro-control. Furthermore, according to invention according to claim 27, when the temperature or heat exchanger temperature of a car driving means cooling means is below a predetermined value, compared with the time beyond a predetermined value, it is characterized by lessening the amount of reflection to actuation of crew or control of a control change request. Here, the temperature of a car driving means cooling means is the temperature of the cooling water which cools the engine carried in the car, or the temperature of the cooling water which cools the drive motor carried in the car. Moreover, heat-exchanger temperature is the skin temperature of the exhaust-heat-recovery machine which collects exhaust heat of exoergic components, such as skin temperature of the evaporator of a refrigerating cycle, after [Eve] temperature, or an electrical part.

[0017] According to invention according to claim 28, when the elapsed time after a dc-battery injection, car driving means actuation, air-conditioning actuation, or ventilation actuation is below a predetermined value, compared with the time beyond a predetermined value, it can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of reflection to actuation of crew or control of a control change request. Moreover, you may make it change the detection value of the detection means which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost in the direction in which aperture cloudiness tends to occur with time amount according to invention according to claim 29. Furthermore, you may make it change any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means in the direction in which aperture cloudiness tends to occur with time amount according to invention according to claim 30. Furthermore, you may make it change a window temperature presumption means in the direction in which aperture cloudiness tends to occur with time amount according to invention according to claim 31.

[0018] According to invention according to claim 32, after actuation of crew or a control change request can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification of the detection value of the detection means which has effectiveness in removal of the prevention the aperture cloudiness changed with time amount, or with frost, aperture cloudiness, or frost compared with a crew's actuation or control change-request front. Moreover, according to invention according to claim 33, after actuation of crew or a control change request can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification of any one or more detection values of dew condensation or the window transmittance of the humidity or the window changed with time amount, or the window temperature detection means compared with a crew's actuation or control change-request front. Furthermore, according to invention according to claim 34, after actuation of crew or a control change request can prevent that the control characteristic of antifog control changes rapidly by lessening the amount of modification of the window temperature presumption means changed with time amount compared with a crew's actuation or control change-request front.

[0019] You may make it change the amount of modification or the amount of amendments changed or amended according to actuation of the past crew or a control change request according to any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means according to invention according to claim 35. Moreover, you may make it change or amend mostly, so that it is separated from the amount of modification or the amount of amendments changed or amended according to actuation of the past crew or a control change request of any one or more detection values of dew condensation or the window transmittance of humidity or a window, or the window temperature detection means with the aperture cloudiness generating value assumed beforehand according to invention according to claim 36.

[0020] When according to invention according to claim 37 it was in case of rainy weather or snowfall and presumed or detects Since it turns out that window temperature becomes almost equal to outside air temperature, when it was in case of rainy weather or snowfall and presumed or detects The control characteristic of antifog control can be promptly doubled with crew's air-conditioning feeling by comparing, when it was not in case of rainy weather or snowfall and presumed or detects, and making

[many] the amount of modification or the amount of amendments changed or amended according to actuation of the past crew or a control change request. Moreover, even when according to invention according to claim 38 it was in case of rainy weather or snowfall and a cheap detection means with many errors is used by changing the detection value of a detection means detect the physical quantity which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost, according to the count presumed or detected, and using for control, the control characteristic of antifog control can double with crew's air-conditioning feeling.
[0021] When it is in case of rainy weather or snowfall, and there are few counts presumed or detected, since it turns out that window temperature becomes almost equal to outside air temperature when according to invention according to claim 39 it was in case of rainy weather or snowfall and presumed or detects, and it is in case of rainy weather or snowfall, compared with the time with many counts presumed or detected, it is desirable to lessen the amount of amendments of a window temperature presumption means. Moreover, it may compare, when according to invention according to claim 40 it is in case of rainy weather or snowfall, there are few counts presumed or detected, it is in case of rainy weather or snowfall and there are many counts presumed or detected, and the amount of modification or the amount of amendments changed or amended according to actuation of the past crew or a control change request may be lessened.
[0022]
[Embodiment of the Invention] [Configuration of the 1st operation gestalt] Drawing 1 thru/or drawing 18 are what showed the 1st operation gestalt of this invention, drawing 2 is drawing having shown the whole air-conditioning unit configuration, drawing 3 is drawing having shown the instrument panel of a car, and drawing 4 is drawing having shown the air-conditioner control panel.
[0023] The air conditioner for cars of this operation gestalt is constituted so that the actuator of each air-conditioning equipment in the air-conditioning unit 1 which air-conditions the vehicle interior of a room of cars, such as an automobile carrying an engine, may be controlled by the air-conditioning control unit (control-circuit substrate: henceforth Air-conditioner ECU) 10. The air-conditioning unit 1 is an air-conditioner unit which the temperature control of the air-conditioning zone by the side of the driver's seat (the backseat on the right-hand side of a car is included) of the vehicle interior of a room and the air-conditioning zone by the side of a passenger seat (the backseat on the left-hand side of a car is included) is carried out, and mutually-independent [of outlet Mohd's modification] is carried out, and can perform it.
[0024] The air-conditioning unit 1 is equipped with the air-conditioning duct 2 arranged ahead of [of a car] the vehicle interior of a room. The inside-and-outside mind change door 3 and the blower 4 are formed in the upstream of this air-conditioning duct 2. The inside-and-outside mind change door 3 is an inlet port change means to drive with the actuator of servo motor 5 grade, and to change the opening (the so-called inlet port Mohd) of bashful inlet port 6 and open air inlet port 7. A blower 4 is a centrifugal fan made to generate the airstream which a rotation drive is carried out by the blower motor 9 controlled by the blower drive circuit 8, and goes in the vehicle interior of a room in the air-conditioning duct 2.
[0025] The evaporator (heat exchanger for cooling) 41 which constitutes the heat exchanger (air-conditioning equipment) of this invention which cools the air which passes through the inside of the air-conditioning duct 2 is formed in the center section of the air-conditioning duct 2. Moreover, the heater core (heat exchanger for heating) 42 which heats the air which passes the 1st and 2nd air duct 11 and 12 is formed in the downstream of the evaporator 41. In addition, the 1st air duct 11 and the 2nd air duct 12 are divided by the diaphragm 14. The drivers side for carrying out mutually-independent [of the temperature control of the drivers side air-conditioning zone of the vehicle interior of a room and a passenger side air-conditioning zone], and performing it and the passenger side air mix (A/M) doors 15 and 16 are formed in the downstream of the heater core 42. And a drivers side and the passenger side A/M doors 15 and 16 are driven with the actuator of a servo motor 17 and 18 grades, and adjust whenever [blow-off temperature / of the air which blows off towards a drivers side and a passenger side].
[0026] Here, the evaporator 41 of this operation gestalt accomplishes one component part of a

refrigerating cycle. The refrigerant compressor which belt driving of the refrigerating cycle is carried out to the output shaft of the engine for car transit carried in the engine room of a car, and compresses and carries out the regurgitation of the refrigerant (compressor), The refrigerant condenser which makes the refrigerant breathed out from this compressor condensate-ize (capacitor), It consists of a receiver (receiver) which carries out vapor liquid separation of the liquid cooling intermediation which flowed from this capacitor, an expansion valve to which adiabatic expansion of the liquid cooling intermediation which flowed from this receiver is carried out, and an above-mentioned evaporator (refrigerant evaporator) 41 which carries out the evaporation evaporation of the refrigerant of the gas-liquid two phase state which flowed from this expansion valve.

[0027] A compressor is equivalent to the air-conditioning equipment (actuator) of this invention, and the rotational motion force from an engine is [among these] intermittent with the electromagnetic clutch (it is equivalent to the actuator of this invention) controlled by the air-conditioner ECU 10. And when an electromagnetic clutch is turned on and a compressor starts, an evaporator 41 cools and dehumidifies the air which passes through the inside of the air-conditioning duct 2. Moreover, with this operation gestalt, the capacity good transformation compressor which has the electromagnetic capacity control valve which performs capacity adjustable control based on the control signal outputted according to the comparison result of the after [Eve] temperature (TE) which is the detection value of the after [Eve] temperature sensor 74, and after [target Eve] temperature (TEO) is used.

[0028] and at the air down-stream edge (front face of an instrument panel 50) of each blow-off duct which is open for free passage to the air downstream of the 1st air duct 11 The drivers side defroster (DrDEF) outlet 20 for blowing off an air-conditioning wind towards the inside of the front window glass of a drivers side, as shown in drawing 2 and drawing 3 , The drivers side pin center,large face (DrFACE) outlet 21 and the drivers side side face (DrFACE) outlet 22 for blowing off an air-conditioning wind towards the cephalothorax of the crew of a drivers side, or the inside of side window glass, The drivers side foot (DrFOOT) outlet 23 for blowing off an air-conditioning wind towards guide-peg Motobe, the crew of a drivers side, is carrying out opening.

[0029] moreover, at the air down-stream edge (front face of an instrument panel 50) of each blow-off duct which is open for free passage to the air downstream of the 2nd air duct 12 The passenger side defroster (PaDEF) outlet 30 for blowing off an air-conditioning wind towards the inside of the front window glass of a passenger side, The passenger side pin center,large face (PaFACE) outlet 31 and the passenger side side face (PaFACE) outlet 32 for blowing off an air-conditioning wind towards the cephalothorax of the crew of a passenger side, or the inside of side window glass, The passenger side foot (PaFOOT) outlet 33 for blowing off an air-conditioning wind towards guide-peg Motobe, the crew of a passenger side, is carrying out opening.

[0030] And in the 1st and 2nd air duct 11 and 12, the drivers side for carrying out mutually-independent [of the setup of outlet Mohd of the drivers side of the vehicle interior of a room and a passenger side], and performing it, the passenger side outlet change doors 24-26, and 34-36 are prepared. And a drivers side, the passenger side outlet change doors 24-26, and 34-36 are the Mohd change doors which drive with the actuator of servo motors 28, 29, and 38 and 39 grades, and change outlet Mohd of a drivers side and a passenger side, respectively. Here, as outlet Mohd of a drivers side and a passenger side, FACE Mohd, B/L Mohd, FOOT Mohd, F/D Mohd, DEF Mohd, etc. have.

[0031] In addition, a drivers side and the passenger side outlet change doors 24 and 34 are the drivers side which mutually-independent [of the DrDEF outlet 20 and the PaDEF outlet 30] is carried out, and can open and close them, and a passenger side defroster door (air-conditioning equipment), and the servo motors 28 and 38 constitute the actuator of the air-conditioning equipment which performs removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost. And two or more swing louvers which can change the blow-off direction of the air-conditioning style which blows off from each outlet are attached in the pin center,large grill and side grill which form the DrFACE outlets 21 and 22 and the PaFACE outlets 31 and 32, respectively.

[0032] An air-conditioner ECU 10 is equivalent to the storage means of this invention, a window temperature detection means, a window temperature presumption means, and an antifog control means,

and when the ignition switch which manages starting and a halt of an engine is thrown in (IG-ON), if DC power supply are supplied from the dc-battery (not shown) which is the mounted power source carried in the car, it is constituted so that data processing and control processing may be started. As shown in the air-conditioner ECU 10 at drawing 2 and drawing 4 , each switch signal from the various switches on the air-conditioner control panel 51 installed in one is inputted into the instrument panel 50 of the front face of the vehicle interior of a room.

[0033] And a liquid crystal display (display) 52, the inlet port Mohd circuit changing switch 53, the front defroster switch (henceforth a DEF switch) 54, the rear defroster (defogger) switch 55, the DUAL switch 56, the outlet Mohd (MODE) circuit changing switch 57, the blower airflow circuit changing switch 58, the AUTO switch 60, the off-switch 61, the A/C switch 59, the driver's seat (DRIVER) side temperature configuration switch 62, and the passenger seat (PSSENGER) side temperature configuration-switch 63 grade are installed in the air-conditioner control panel 51. The DUAL switch 56 of the above is a right-and-left independent-control command means to order it the right-and-left independent temperature control which carries out mutually-independent [of the temperature control in a drivers side air-conditioning zone, and the temperature control in a passenger side air-conditioning zone], and performs them. Moreover, the MODE circuit changing switch 57 changes outlet Mohd to FACE Mohd, B/L Mohd, FOOT Mohd, or F/D Mohd according to actuation of crew.

[0034] And the laying temperature of the air-conditioning zone of a drivers side and a passenger side, outlet Mohd, blower airflow, etc. are displayed on a display 52. And the drivers side temperature configuration switch 62 is a drivers side temperature setting means for setting the temperature in a drivers side air-conditioning zone as desired temperature, and consists of rise switch 62a and down switch 62b. Moreover, the passenger side temperature configuration switch 63 is a passenger side temperature setting means for setting the temperature in a passenger side air-conditioning zone as desired temperature, and consists of rise switch 63a and down switch 63b. In addition, various kinds of actuation switches on the air-conditioner control panel 51 may be formed on the display 52.

[0035] Moreover, after the microcomputer of the common knowledge constituted including functions, such as CPU, memory (ROM, or EEPROM, RAM), and an I/O Port (an input/output circuit), is prepared in the interior of an air-conditioner ECU 10 and A/D conversion of the sensor signal from various sensors is carried out by the input circuit, it is constituted so that it may be inputted into a microcomputer. That is, the sun sensor 73 grade as a solar radiation detection means which detects the intensity of radiation (solar intensity) irradiated in the bashful ** sensor 71 as an inner atmospheric temperature detection means to detect the air temperature (for it to also be called a bashful ** and following room temperature) of the vehicle interior of a room, the outside-air-temperature sensor 72 as an outside-air-temperature detection means to detect a vehicle outdoor air temperature (henceforth outside air temperature) and a drivers side, and a passenger side air-conditioning zone is connected to the input circuit of an air-conditioner ECU 10.

[0036] moreover, in the input circuit of an air-conditioner ECU 10 As an after [Eve] temperature detection means to detect the air temperature (henceforth after [Eve] temperature) immediately after passing an evaporator 41 As a cooling water temperature detection means to detect the cooling water temperature of the engine of the after [** Eve] temperature sensor 74, and a car The speed sensor 77 grade as a vehicle speed detection means to detect the ****** coolant temperature sensor 75, the humidity sensor 76 as a humidity detection means to detect near [crew] relative humidity (relative humidity of the vehicle interior of a room), and the travel speed (vehicle speed) of a car is connected.

[0037] The sun sensor 73 is installed among these on the instrument panel 50 near [by the side of the method of the forefront of the vehicle interior of a room] the front window. In addition, a sun sensor 73 detects the intensity of radiation (solar intensity) irradiated in a drivers side air-conditioning zone, detects the intensity of radiation (solar intensity) irradiated in a passenger side air-conditioning zone as a drivers side solar intensity detection means (for example, photodiode) to generate output signal TS' (Dr) corresponding to the solar intensity, and has a passenger side solar intensity detection means (for example, photodiode) to generate output signal TS' (Pa) corresponding to the solar intensity. Here, the humidity sensor 76 of this operation gestalt is the thing of a large low price with error, and is held in the

hollow formed in the front face of the instrument panel 50 near the driver's seat with the bashful ** sensor 71. In addition, the hollow is closed by lid 50a in which the bleeder was formed.
[0038] The [control approach of the 1st operation gestalt] Next, the air-conditioning control approach by the air-conditioner ECU 10 of this operation gestalt is explained based on drawing 1 thru/or drawing 18 . Here, drawing 5 is the flow chart which showed an example of the control program of an air-conditioner ECU 10.
[0039] First, if an ignition switch is turned on and DC power supply are supplied to an air-conditioner ECU 10, activation of the control program (routine of drawing 5) beforehand memorized by ROM will be started. At this time, the contents of storage of the memory (RAM) for data processing built in the microcomputer of the air-conditioner ECU10 interior etc. are initialized first (step S1). Next, various data are read into the memory (RAM) for data processing. That is, the switch signal from various actuation switches and the sensor signal from various sensors are inputted (step S2).
[0040] Especially, the output signal (vehicle speed signal) SPD corresponding to the vehicle speed which is the output signal (outside-air-temperature signal) TAM corresponding to the outside air temperature which is the detection value of the output signal (inner atmospheric temperature signal) TR corresponding to bashful ** which is the detection value of the bashful ** sensor 71, and the outside-air-temperature sensor 72, and the detection value of a speed sensor 77 etc. is inputted, and it memorizes in the memory for data processing. Moreover, output-signal (sun sensor signal) TS' (Dr) corresponding to the intensity of radiation (solar intensity) which is the detection value of a sun sensor 73, TS' (Pa), etc. are inputted, and it memorizes in the memory for data processing.
[0041] Next, the solar intensity TS (Dr) and TS (Pa) computed by the time constant (delay) of T1 (sec) to sun sensor signal TS' (Dr) memorized at the above-mentioned step S2 and TS' (Pa) is determined. namely, sun sensor signal TS' (Dr), TS' (Pa), the several 1 following formula, and several 2 formula -- being based -- the solar intensity TS (Dr) and TS (Pa) and the time constant T1 of the vehicle interior of a room It calculates (step S3).
[0042]
[Equation 1]

$$TS(Dr) = \{TS'(Dr) + (T1/T)\,TSn\text{-}1(Dr)\} / (T1+T)$$

[Equation 2]

$$TS(Pa) = \{TS'(Pa) + (T1/T)\,TSn\text{-}1(Pa)\} / (T1+T)$$

[0043] However, T is a control period (for example, for [for / 1 second / -] 4 seconds), TSn-1(Dr) is a value in front of 1 period of TS (Dr), and TSn-1(Pa) is a value in front of 1 period of TS (Pa). Moreover, T1 It is the value of a time constant prepared in the solar intensity TS (Dr) and TS (Pa) required to control the blower control voltage VA (Dr) and VA (Pa) impressed to the blower motor 9 of a blower 4, a drivers side, the passenger side outlet change doors 24-26, 34-36 and a drivers side, and the passenger side A/M doors 15 and 16, for example, is for [for / 30 seconds / -] 61 seconds.
[0044] Next, based on the above stored data, the several 3 following formula, and several 4 formula, TAO (Pa) is calculated [whenever / target blow-off temperature / of a drivers side] whenever [TAO (Dr) and target blow-off temperature / of a passenger side] (whenever [target blow-off temperature] decision means : step S4).
[0045]
[Equation 3]

$$TAO(Dr) = KSET \cdot TSET(Dr) - KR \cdot TR - KAM \cdot TAM - KS \cdot TS(Dr) + Kd(Dr) \times \{CD(Dr) + Ka(Dr)(10 - TAM)\} \times \{TSET(Dr) - TSET(Pa)\} + C$$

[Equation 4]

$$TAO(Pa) = KSET \cdot TSET(Pa) - KR \cdot TR - KAM \cdot TAM - KS \cdot TS(Pa) + Kd(Pa) \times \{CD(Pa) + Ka(Pa)(10 - TAM)\} \times \{TSET(Pa) - TSET(Dr)\} + C$$

[0046] However, TSET (Dr) and TSET (Pa) express the laying temperature of a drivers side air-conditioning zone, and the laying temperature of a passenger side air-conditioning zone, respectively, and TRTAM expresses outside air temperature whenever [vehicle room air temperature], respectively. KSET, KR, KAM, KS and Kd (Dr), and Kd (Pa) express the temperature-gradient amendment gain of gain, outside-air-temperature gain, intensity-of-radiation gain, a drivers side, and a passenger side air-conditioning zone whenever [temperature setting gain and vehicle room air temperature], respectively.
[0047] In addition, Ka (Dr) and Ka (Pa) express the gain which amends the effect degree which outside air temperature TAM exerts on each air-conditioning temperature of a drivers side air-conditioning zone and a passenger side air-conditioning zone, respectively, and the constant [CD / CD (Dr) and / (Pa)] according to the above-mentioned effect degree and C express an amendment constant. Here, values, such as Ka (Dr), Ka (Pa), CD (Dr), and CD (Pa), change with various parameters, such as a form of a car, and the blow-off direction from each outlet of magnitude and the air-conditioning unit 1.
[0048] whenever [next, / target blow-off temperature / of the drivers side for which it asked by the above-mentioned step S4, and a passenger side] -- TAO (Dr) and TAO (Pa) -- being based -- blower airflow -- {-- all -- blower control voltage VA} impressed to the airflow:blower 4 is calculated (step S5). Specifically, the above-mentioned blower control voltage VA has been obtained by carrying out equalization processing of those blower control voltage VA (Dr) and VA (Pa) while it bases for it and asks the property Fig. of drawing 6 for the blower control voltage VA (Dr) and VA (Pa) which suited TAO (Dr) and TAO (Pa) whenever [target blow-off temperature], respectively.
[0049] Next, based on TAO (Dr), TAO (Pa), and the outlet Mohd property over whenever [target blow-off temperature / which was shown in the property Fig. of drawing 7], each outlet Mohd of a drivers side and a passenger side air-conditioning zone is determined whenever [target blow-off temperature / of the drivers side for which it asked by the above-mentioned step S4, and a passenger side] (step S6). In outlet Mohd's decision, whenever [above-mentioned target blow-off temperature], TAO (Dr) and TAO (Pa) are missing from high temperature from low temperature, and, specifically, are determined that it will become FACE Mohd, B/L Mohd, and FOOT Mohd. Moreover, it is fixed to one of outlet Mohd among FACE Mohd, B/L Mohd, FOOT Mohd, and F/D Mohd by operating the MODE circuit changing switch 57 prepared in the air-conditioner control panel 51.
[0050] In addition, above-mentioned FACE Mohd is outlet Mohd who turns an air-conditioning wind to crew's upper half of the body (cephalothorax), and bursts into laughter. Moreover, B/L Mohd is outlet Mohd who turns an air-conditioning wind to crew's upper half of the body (cephalothorax) and guide-peg Motobe, and bursts into laughter. And FOOT Mohd is outlet Mohd who turns an air-conditioning wind to guide-peg Motobe, crew, and bursts into laughter. Furthermore, F/D Mohd is outlet Mohd who turns an air-conditioning wind to the inside of guide-peg Motobe, crew, and the front window of a car, and bursts into laughter. Moreover, it is fixed to DEF Mohd who turns an air-conditioning wind to the inside of front window glass, and bursts into laughter when the DEF switch 54 formed in the air-conditioner control panel 51 is pushed.
[0051] Next, the target A/M opening SW (Pa) of the target A/M opening [of the drivers side A/M door 15] SW (Dr), (%), and passenger side A/M door 16 and (%) are calculated (step S7). In addition, the operation of such the target A/M opening SW (Dr) and the target A/M opening SW (Pa) is performed based on the cooling water temperature (TW) which is the detection value of the cooling coolant temperature sensor 75, and the several 5 following formula and several 6 formula whenever [target blow-off temperature / of a drivers side and a passenger side]. [TAO (Dr), TAO (Pa), and] [the after /

Eve / temperature (TE) which is the detection value of the after / Eve / temperature sensor 74, and]
[0052]
[Equation 5]
$$SW(Dr) = \{TAO(Dr) - TE\} \times 100 / (TW - TE)$$

[Equation 6]
$$SW(Pa) = \{TAO(Pa) - TE\} \times 100 / (TW - TE)$$

[0053] Next, the routine of drawing 1 and drawing 15 starts, and antifog control which has effectiveness in removal of the prevention with aperture cloudiness or frost, aperture cloudiness, or frost is performed (step S8). Next, an output signal is sent to the blower drive circuit 8 so that it may become the determined blower control voltage VA (Dr) and VA (Pa). Moreover, energization control of the servo motors 28, 29, 38, and 39 is carried out so that it may become determined outlet Mohd. Furthermore, energization control of the servo motors 17 and 18 is carried out so that it may be set to the determined target A/M opening SW (Dr) and SW (Pa). Moreover, when a compressor judging flag is ON (CFLAG=1), an electromagnetic clutch is turned on, and when a compressor judging flag is OFF (CFLAG=O), the electromagnetic clutch of a compressor is turned off (step S9). Next, after control period time amount (between [for / 0.1 seconds / -] T:, for example, 4.0 seconds) predetermined at step S10 passes, it returns to processing of step S2.
[0054] Next, the antifog control by the air-conditioner ECU 10 is explained based on drawing 8 thru/or drawing 18 . Here, drawing 1 is the flow chart which showed the humidity sensor appearance value amendment control by the air-conditioner ECU 10, and drawing 15 is the flow chart which showed the antifog control based on the humidity sensor appearance value by the air-conditioner ECU 10.
[0055] First, if the routine of drawing 1 starts, since it does not have the sensor which carries out direct detection of the window temperature (dew point temperature of front window glass) required in order to calculate the near [a window] relative humidity RHw, and specific humidity at saturation RHW, based on the detection value of various kinds of sensors which detect the air-conditioning thermal load of the vehicle interior of a room, temperature (window temperature) of front window glass is presumed (window temperature presumption means: step S11). (operation)
[0056] Here, presumption of the temperature of front window glass, i.e., the operation of window temperature, is calculated using the neuro-control shown in drawing 8 thru/or drawing 11 . As input data of this neuro-control, as shown in drawing 10 , the car travel speed (vehicle speed) SPD which are the intensity of radiation TS which are the outside air temperature TAM which is the detection value of bashful ** TR which is the detection value of the bashful ** sensor 71, and the outside-air-temperature sensor 72, and the detection value of a sun sensor 73, and the detection value of a speed sensor 77 is used. Since the neural network who uses this neuro-control for the operation of the window temperature of drawing 8 (a), and the neural network who uses for the operation of the window temperature of drawing 9 (c) are the same configurations fundamentally, he explains taking the case of the neural network who uses for the operation of the window temperature of drawing 8 (a).
[0057] A neural network is a certain input signal (in the example of drawing 8). So that the output may become the value (teacher data) of the request set up beforehand, when SPD, TS, TAM, and TR are given The back propagation error learning function (back proper GESHON function) to correct the coupling coefficient 106 (synapse load) between each neurone 105 of the input layer [which was prepared in the neural network { drawing 8 (a)}] 101, 1st and 2nd interlayer 102 and 103, and output layer 104 interior It is the network of the layered structure which it had.
[0058] And when teacher data are changed, a coupling coefficient (synapse load) 106 is corrected by "making it learn repeatedly" so that it may become teacher data after the output to a certain input signal changing again. That is, it has the description which generates the correlation function (coupling coefficient 106) automatically from a lot of data (teacher data). Teacher data set up the value (output value of the request to an input signal) of the request for which it asked by experiment etc.
[0059] In the neural network { drawing 8 (a)} of a layered structure, there is no association between the

neurone 105 of the same layer, and it is combined only by the neurone 105 of each class of order. The coupling coefficient 106 between the neurone 105 of each class expresses extent of the weight (strength) of each association, and the signal of the neurone 105 of the layer by the side of before turns into a signal with the large amplitude, and it is transmitted to the neurone 105 of the layer on the backside, so that the weight of association is large.

[0060] In addition, the value which the I/O value was standardized by 0-1 in the sensor signal etc., respectively as shown in drawing 10 (normalization), and was actually outputted needs the activity which carries out inverse transformation from 0-1. For example, the actual detection range of bashful ** (TR) detected by the bashful ** sensor 71 is 0 degree C - 50 degrees C, assigns this detection value to 0-1 in the standardization (normalization) section 107, and usually inputs it into a neural network's { drawing 8 (a)}'s input layer 101. Since the value of 0-1 is outputted, inverse transformation also of the output from the output layer 104 is carried out to the actual value corresponding to a sensor signal etc. with the conversion map beforehand set up in the output transducer.

[0061] And in the state of car loading, the neural network { drawing 8 (a)} of each calculation section in an air-conditioner ECU 10 (operation part) calculates the output to an input, as shown in drawing 11 . That is, at each neurone 105, it is input signal O1 -On. An output is calculated by multiplying the coupling coefficient 106 (W1 -Wn) corresponding to each, and applying the value to the function called a sigmoid function. It outputs as an input of the neurone of consecutiveness to the count result. A final output is obtained by repeating this.

[0062] By the way, as a neural network's description, when a certain input signal is given Since it has the learning function of making the automatic correction of the coupling coefficient 106 between each class inside a neural network (synapse load) so that the output may become the value (teacher data) of the request set up beforehand, The output corresponding to a specific input condition can be changed into a desired value by changing the teacher data in a specific input condition, and making beforehand automatic correction of a coupling coefficient (synapse load) 106 using the high-speed arithmetic unit. And by other input conditions, even if it changes the output (teacher data) in a specific input condition, since automatic correction of the coupling-coefficient 106 whole is made so that a desired output value (teacher data) may be maintained, output modification by the specific input condition does not affect the output in other input conditions. Consequently, acquiring the desired antifog control characteristic is attained easily.

[0063] Next, the near [crew] relative humidity (relative humidity of the vehicle interior of a room) RH which is the detection value of a humidity sensor 76 is read. That is, as shown in the property Fig. of drawing 12 , after carrying out A/D conversion of the output voltage (V) outputted from a humidity sensor 76 in proportion to near [crew] relative humidity, it reads into the microcomputer of an air-conditioner ECU 10, and it memorizes in the memory (RAM) for data processing (step S12).

[0064] Next, the count of ON of the memorized ignition switch (count of IG-ON) is read (step S13). Here, the count of IG-ON is memorized by the memory (RAM) for data processing in the air-conditioner ECU 10 backed up with battery voltage. Next, the count of actuation of the memorized DEF switch 54 (count of DEF switch actuation) is read (step S14). Here, the count of DEF switch actuation is memorized by the memory (RAM) for data processing in the air-conditioner ECU 10 backed up with battery voltage.

[0065] Next, it judges whether the DEF switch 54 is operated (step S15). When this judgment result is YES (i.e., when a DEF switch is not operated until now), the count of ON of an ignition switch (count of IG-ON) is updated (step S16). (+1)

[0066] Moreover, when the judgment result of step S15 is NO, or after carrying out control processing of step S16, the amendment humidity value (after [amendment] relative humidity) of the humidity sensor 76 used for antifog control is calculated based on the several 7 following formula (step S17).

[Equation 7]

補正後相対湿度＝湿度センサ７６の検出値

＋KDEF ×ＤＥＦ操作回数－KIG×ＩＧ・ＯＮ回数

Here, it is KDEF =0.3 and KIG=0.1.
[0067] Therefore, since the detection value of a humidity sensor 76 may show the low value compared with actual relative humidity, it is amended so that the humidity sensor amendment humidity value used for antifog control may become high, so that the DEF switch 54 is pushed. Moreover, if the DEF switch 54 is not pushed, since the detection value of a humidity sensor 76 may show the high value compared with actual relative humidity, it is amended so that the humidity sensor amendment humidity value used for antifog control may become low. Even when this uses the cheap humidity sensor 76 with a large error for antifog control, antifog control can be performed correctly and easily by low cost.
[0068] Next, near [a window] relative humidity (RHw) is calculated from the window temperature (TWG) presumed at the crew side relative humidity (after [amendment] humidity) RH computed at step S17, and step S11 (step S18). Next, the comfortable humidity of the crew side relative humidity (after [amendment] humidity) RH computed at step S17 is calculated. For example, it is based on the property Fig. of several 8 a following formula and following drawing 13 , for example, the relative humidity of 25 degrees C (RH25) is calculated (step S19).
[Equation 8]

$$RH25 = f(TR) \times RH / 100 \ (\%)$$

However, RH is the detection value (after [amendment] humidity) of a humidity sensor 76, and f (TR) is the function (humidity correction factor) of bashful ** TR.
[0069] Next, it is based on the property Fig. of several 9 a following formula and following drawing 14 as an antifog decision value for judging whether the inside of front window glass tend to bloom cloudy, or it is hard to bloom cloudy, and the specific humidity at saturation of 25 degrees C (moisture humidity: RHW25) is calculated from the window temperature (TWG) presumed at step S11 (step S20). In addition, although window temperature (TWG) is expressed with the function of bashful ** (TR), intensity of radiation (TS), outside air temperature (TAM), and the vehicle speed (SPD) as mentioned above, it serves as window temperature (TWG) = outside air temperature (TAM) in case of rainy weather.
[Equation 9]

$$RHW25 = f(TWG) \ (\%)$$

However, f (TWG) is the function of the window temperature TWG.
[0070] Next, the routine of drawing 15 starts, it is based on the property Fig. of drawing 16 , the relative humidity of 25 degrees C (RH25) and the specific humidity at saturation of 25 degrees C as an antifog decision value (RHW25) are measured, and it judges whether the inside of front window glass tend to bloom cloudy, or it is hard to bloom cloudy (step S21). When this judgment result is NO, a compressor judging flag is turned off in order to judge that the inside of front window glass cannot bloom cloudy easily and to lower the operating ratio of a compressor (step S22). (CFLAG=0) It escapes from the routine of drawing 15 after that. Moreover, when the judgment result of step S21 is YES, it judges that the inside of front window glass tends to bloom cloudy, and the compressor judging flag which turns on the electromagnetic clutch of a compressor is turned on (step S23). (CFLAG=1)
[0071] therefore, with this operation gestalt, as antifog control which performs effectively prevention or removal of the cloudiness of the inside of front window glass When judging with the detection value (after [amendment] humidity) and antifog decision value (specific humidity at saturation) of a humidity sensor 76 being compared, and it being easy to bloom cloudy The air which turns on a compressor and blows off to the vehicle interior of a room by the evaporator 41 is dehumidified. By spraying this warm air that was dehumidified and was reheated with the heater core 42 on the inside of front window glass from the outlet of the DrDEF outlet 20 and PaDEF outlet 30 grade, window temperature is raised and cloudy prevention or removal accomplishes.
[0072] Next, with this operation gestalt, since the variable-capacity mold compressor is used, after [target Eve] temperature (TEO) is calculated in order to control the discharging volume of a compressor (step S24). With this operation gestalt, it is made to carry out by the neuro-control for

computing the after [target Eve] temperature which showed the operation of after [target Eve] temperature (TEO) to drawing 8 (b) or drawing 9 (d), and drawing 11 . In addition, since it is the same as that of the neuro-control for computing window temperature, and abbreviation, detailed explanation is omitted. At this time, the outside air temperature (TAM) which is the detection value of the near [crew] relative humidity (after [amendment] humidity) and the outside-air-temperature sensor 72 for which it asked at step S17 is used as input data of neuro-control the near [a window] relative humidity for which it asked at step S18, and whenever [target blow-off temperature / for which it asked by step S4] (TAO). When the relative humidity which was difficult in the Prior art rises to near the threshold value of aperture cloudiness by using such neuro-control, complicated control of gathering the operating ratio of a compressor rapidly can be performed easily.

[0073] Next, after determining after [target Eve] temperature (TEO) as mentioned above, the target discharging volume of a compressor is determined in feedback control (PI control) so that the actual after [Eve] temperature (TE) which is the detection value of the after [Eve] temperature sensor 74, and after [target Eve] temperature (TEO) may be in agreement (step S25). It escapes from the routine of drawing 15 after that. the electromagnetism of the electromagnetic capacity control valve specifically attached to the compressor -- the solenoid current (control current: In) used as the desired value of the control current supplied to a solenoid is calculated based on the several 10 following formula and several 11 formula.

[Equation 10]

$$En = TE - TEO$$

[Equation 11]

$$In = In\text{-}1 - Kp \{ (En - En\text{-}1) + (\theta / Ti) \times En$$

[0074] TE is the actual after [Eve] temperature which is the detection value of the after [Eve] temperature sensor 74 here. TEO is the after [target Eve] temperature searched for at step S23, and Kp is a proportionality constant (for example, 0.03). In the temperature anomaly of this time [En], it is the temperature anomaly (degree C) of last time [1 / En-], and theta is the sampling time (for example, for 1 second), and In-1 is [Ti is an integration constant (for example 1000), and / it is the control current (A) of this time / In / and] the last control current (A).

[0075] The MODE circuit changing switch 57 prepared on the air-conditioner control panel 51 is pushed, and when a manual setup of outlet Mohd was carried out at F/D Mohd, or the DEF switch 54 which prepared on the air-conditioner control panel 51 is pushed and a manual setup of outlet Mohd is carried out at DEF Mohd, a compressor judging flag is turned on compulsorily (CFLAG=1), the electromagnetic clutch of a compressor is turned on, and you may make it control the operating ratio (discharging volume) of a compressor as mentioned above here.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the flow chart which showed the humidity sensor appearance value amendment control by Air-conditioner ECU (the 1st operation gestalt).
[Drawing 2] It is the mimetic diagram having shown the whole air-conditioning unit configuration (the 1st operation gestalt).
[Drawing 3] It is the front view having shown the instrument panel of a car (the 1st operation gestalt).
[Drawing 4] It is the front view having shown the air-conditioner control panel (the 1st operation gestalt).
[Drawing 5] It is the flow chart which showed an example of the control program of Air-conditioner ECU (the 1st operation gestalt).
[Drawing 6] It is the property Fig. having shown the blower control voltage characteristic over whenever [target blow-off temperature] (the 1st operation gestalt).
[Drawing 7] It is the property Fig. having shown the outlet Mohd control characteristic over whenever [target blow-off temperature] (the 1st operation gestalt).
[Drawing 8] (a) is drawing having shown the neural network who uses for the operation of window temperature, and (b) is drawing having shown the neural network who uses for the operation of after [target Eve] temperature (the 1st operation gestalt).
[Drawing 9] (c) is drawing having shown the neural network who uses for the operation of window temperature, and (d) is drawing having shown the neural network who uses for the operation of after [target Eve] temperature (the 1st operation gestalt).
[Drawing 10] It is drawing having shown the I / O data of neural control or fuzzy control (the 1st operation gestalt).
[Drawing 11] It is drawing having shown the sigmoid function used for a neural network (the 1st operation gestalt).
[Drawing 12] It is the property Fig. having shown the humidity sensor output voltage property over near [crew] relative humidity (the 1st operation gestalt).
[Drawing 13] It is the property Fig. having shown the humidity correction factor to bashful ** (the 1st operation gestalt).
[Drawing 14] It is the property Fig. having shown f (TWG) to window temperature (the 1st operation gestalt).
[Drawing 15] It is the flow chart which showed the antifog control based on the humidity sensor appearance value by Air-conditioner ECU (the 1st operation gestalt).
[Drawing 16] It is the property Fig. having shown the antifog judging property over RH25-RHW25 (%) (the 1st operation gestalt).
[Drawing 17] (a) is the property Fig. having shown the humidity assistant conditioned-weight property over the count of DEF actuation, and (b) is the property Fig. having shown the humidity assistant conditioned-weight property over the count of IG-ON (the 1st operation gestalt).
[Drawing 18] It is the property Fig. having shown the amount property of window temperature

compensation over the count of DEF actuation (the 1st operation gestalt).
[Drawing 19] (a) - (c) is drawing having shown the membership function used for the fuzzy control of window temperature (the 2nd operation gestalt).
[Drawing 20] It is drawing having shown the membership function used for the fuzzy control of window temperature (the 2nd operation gestalt).
[Drawing 21] (a) - (e) is drawing having shown the fuzzy rule used for the fuzzy control of window temperature (the 2nd operation gestalt).
[Drawing 22] (a) - (c) is drawing having shown the membership function used for the fuzzy control of after [target Eve] temperature (the 3rd operation gestalt).
[Drawing 23] (a) - (e) is drawing having shown the fuzzy rule used for the fuzzy control of after [target Eve] temperature (the 3rd operation gestalt).
[Drawing 24] It is the flow chart which showed the outlet modal control based on the humidity sensor appearance value by Air-conditioner ECU (the 4th operation gestalt).
[Drawing 25] It is the property Fig. having shown the outlet Mohd control characteristic over the humidity after amendment (the 4th operation gestalt).
[Drawing 26] It is the flow chart which showed the antifog control based on the humidity sensor appearance value by Air-conditioner ECU (the 5th operation gestalt).
[Drawing 27] It is the property Fig. having shown the humidity correction factor property over whenever [target blow-off temperature] (the 5th operation gestalt).
[Drawing 28] It is the property Fig. having shown the after [target Eve] temperature characteristic over whenever [target blow-off temperature] (the 5th operation gestalt).
[Description of Notations]
1 Air-conditioning Unit
10 Air-conditioner ECU (Storage Means, Window Temperature Detection Means, Window Temperature Presumption Means, Antifog Control Means)
20 DrDEF Outlet
24 Drivers Side Outlet Change Door (Air-conditioning Equipment)
28 Servo Motor (Actuator)
30 PaDEF Outlet
34 Passenger Side Outlet Change Door (Air-conditioning Equipment)
38 Servo Motor (Actuator)
41 Evaporator (Air-conditioning Equipment, Heat Exchanger)
51 Air-conditioner Control Panel
54 DEF Switch
57 Outlet Mohd Circuit Changing Switch
71 Bashful ** Sensor
72 Outside-Air-Temperature Sensor
73 Sun Sensor
74 After [Eve] Temperature Sensor
76 Humidity Sensor (Humidity Detection Means)
77 Speed Sensor

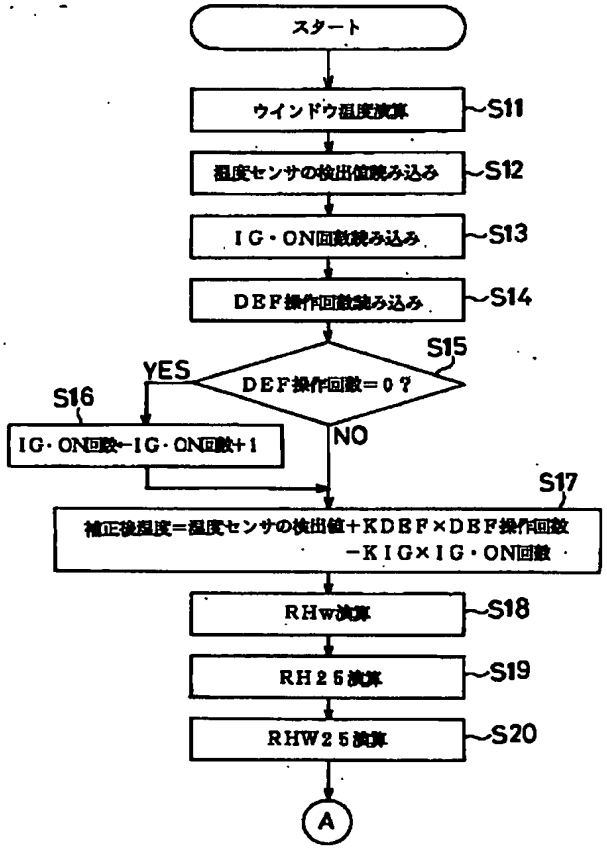
[Translation done.]

* NOTICES *

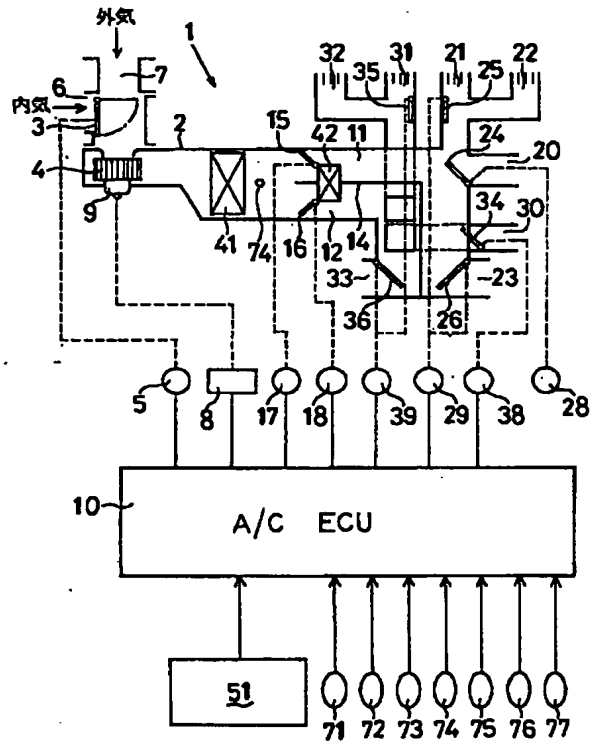
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

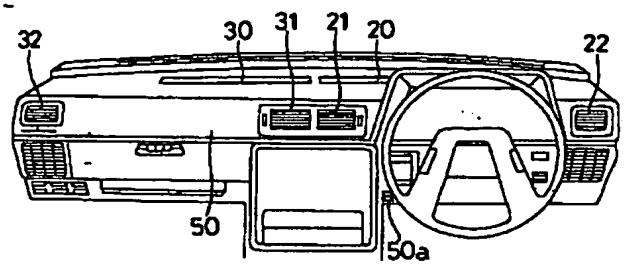
[Drawing 1]



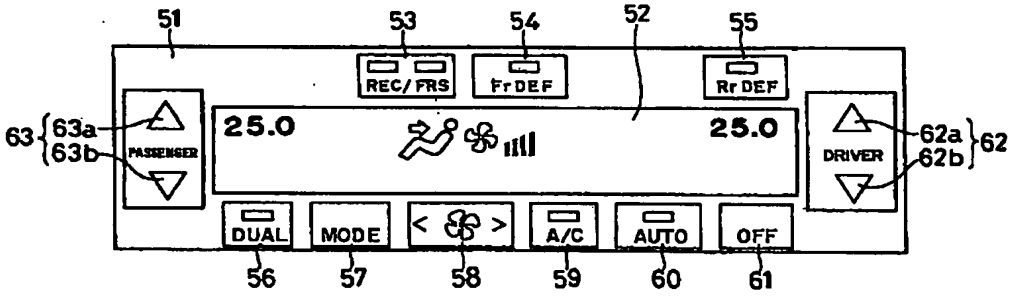
[Drawing 2]


外気
内気
1
2
3
4
5
6
7
8
9
10
A/C ECU
11
12
14
15
16
17
18
20
21
22
23
24
25
26
28
29
30
31
32
33
34
35
36
38
39
41
42
51
71
72
73
74
75
76
77

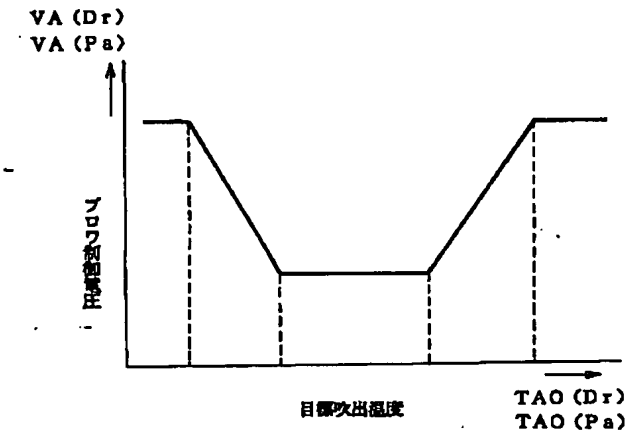
[Drawing 3]



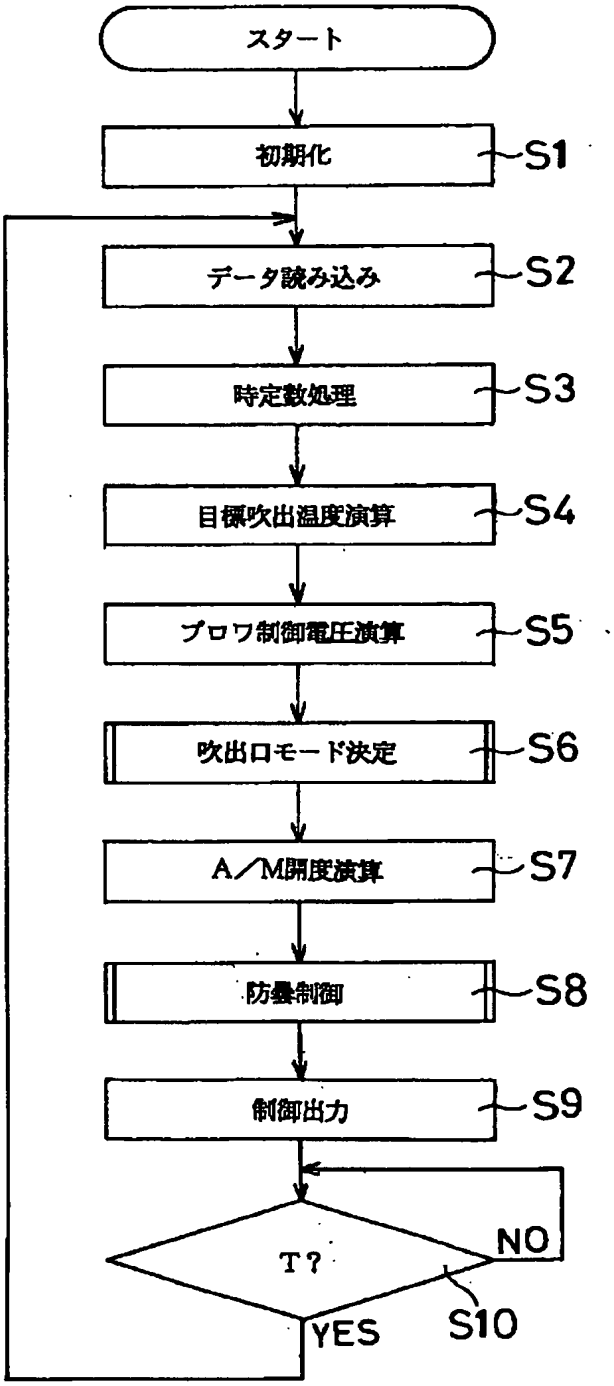
[Drawing 4]



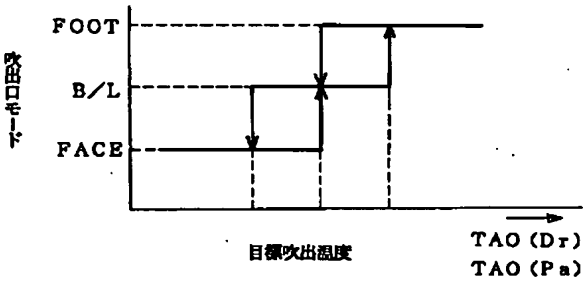
[Drawing 6]



[Drawing 5]

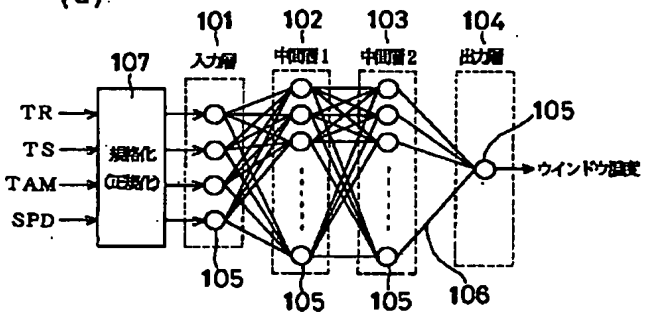

スタート
初期化
S1
データ読み込み
S2
時定数処理
S3
目標吹出温度演算
S4
ブロワ制御電圧演算
S5
吹出口モード決定
S6
A／M開度演算
S7
防曇制御
S8
制御出力
S9
T?
NO
YES
S10

[Drawing 7]

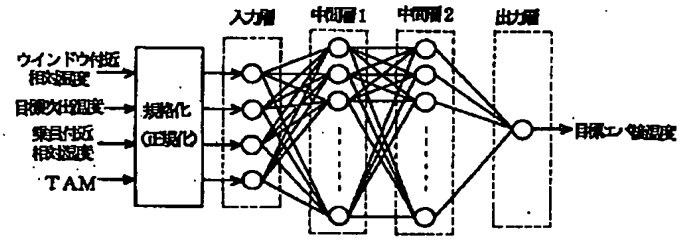

FOOT
B/L
FACE
吹出口モード
目標吹出温度
TAO (Dr)
TAO (Pa)

[Drawing 8]

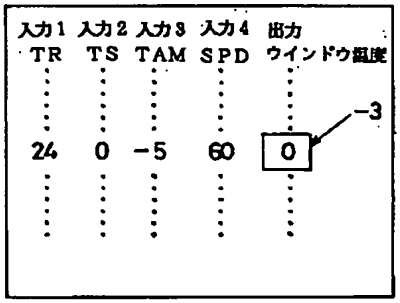
(a)


101
102
103
104
107
入力層
中間層1
中間層2
出力層
TR
TS
TAM
SPD
規格化
(正規化)
105
106
ウインドウ温度

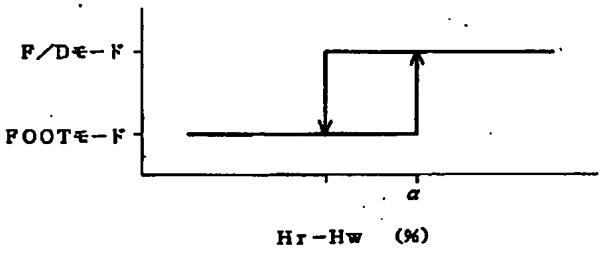
(b)


入力層
中間層1
中間層2
出力層
ウインドウ付近相対湿度
目標吹出温度
乗員付近相対湿度
TAM
規格化
(正規化)

[Drawing 10]

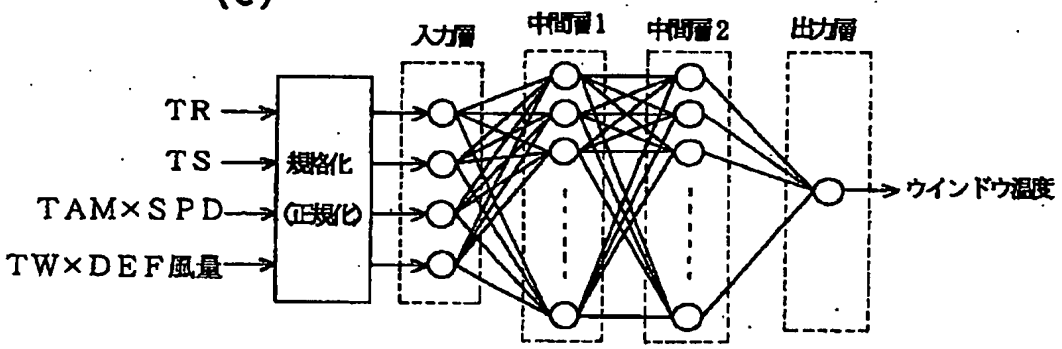


[Drawing 25]

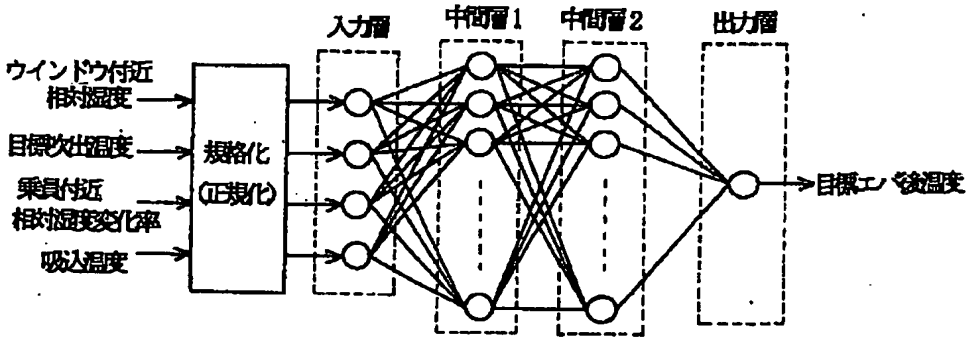


[Drawing 9]

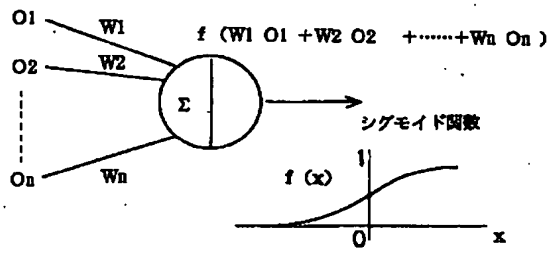
(c)



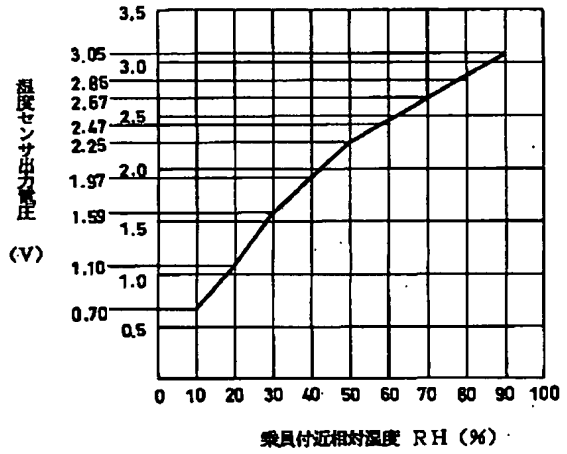
(d)



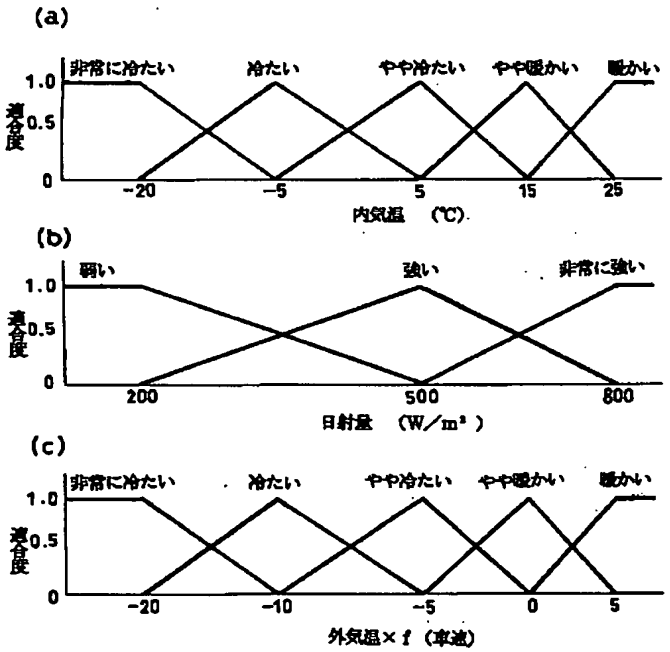
[Drawing 11]



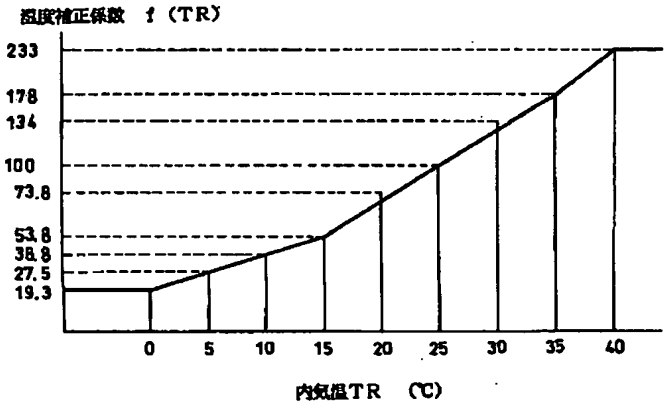
[Drawing 12]


温度センサ出力電圧
(V)
3.05
2.86
2.67
2.47
2.25
1.97
1.59
1.10
0.70
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0 10 20 30 40 50 60 70 80 90 100
乗員付近相対湿度 RH (%)

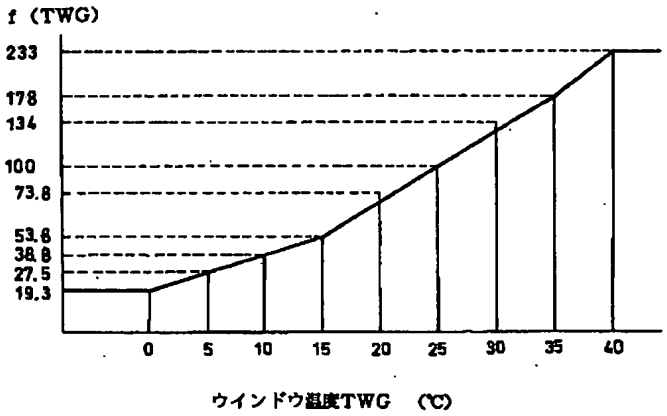
[Drawing 19]


(a)
非常に冷たい
冷たい
やや冷たい
やや暖かい
暖かい
適合度
1.0
0.5
0
-20 -5 5 15 25
内気温 (℃)
(b)
弱い
強い
非常に強い
適合度
1.0
0.5
0
200 500 800
日射量 (W/m²)
(c)
非常に冷たい
冷たい
やや冷たい
やや暖かい
暖かい
適合度
1.0
0.5
0
-20 -10 -5 0 5
外気温×f (車速)

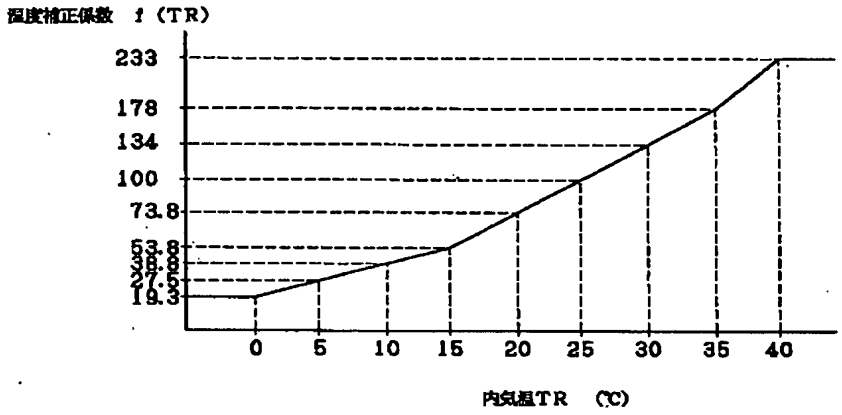
[Drawing 13]



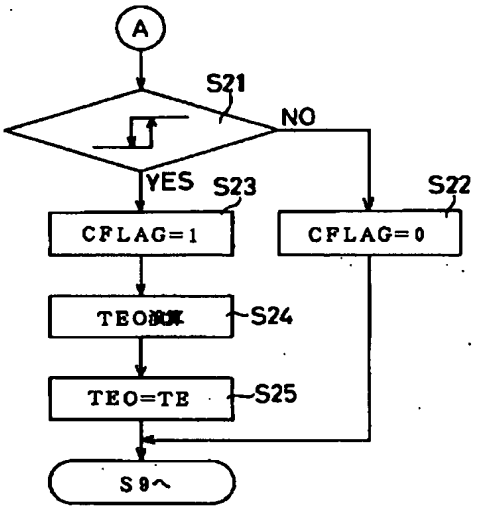
[Drawing 14]



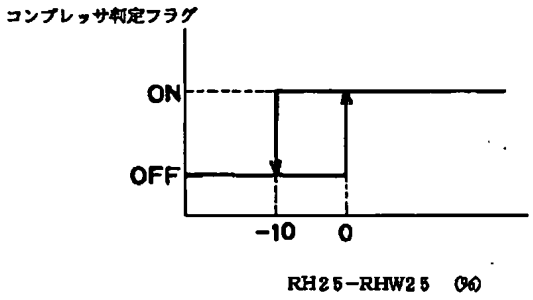
[Drawing 27]



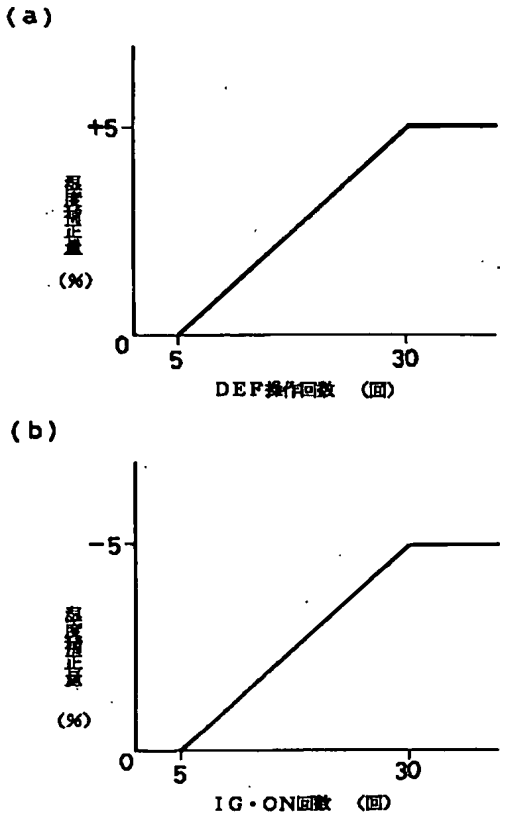
[Drawing 15]



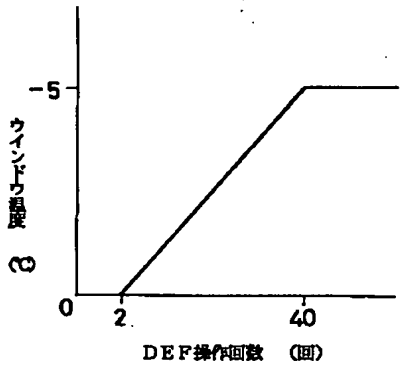
[Drawing 16]



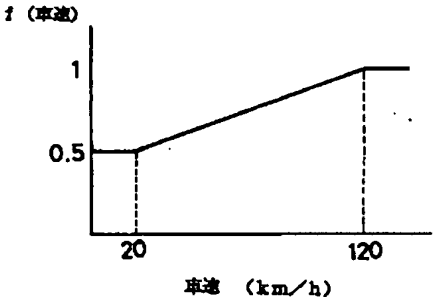
[Drawing 17]



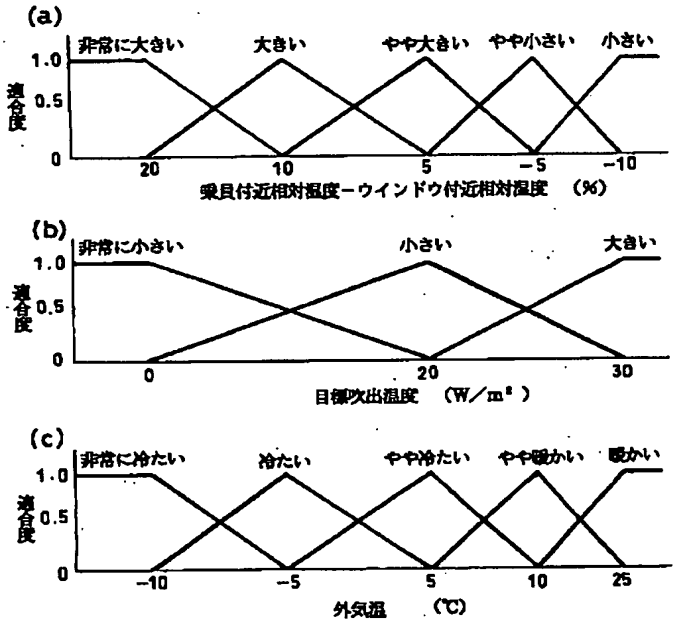
[Drawing 18]



[Drawing 20]



[Drawing 22]


(a)
非常に大きい
大きい
やや大きい
やや小さい
小さい
1.0
0.5
0
適合度
20
10
5
−5
−10
乗員付近相対湿度－ウインドウ付近相対湿度 (%)
(b)
非常に小さい
小さい
大きい
1.0
0.5
0
適合度
0
20
30
目標吹出温度 (W/m²)
(c)
非常に冷たい
冷たい
やや冷たい
やや暖かい
暖かい
1.0
0.5
0
適合度
−10
−5
5
10
25
外気温 (℃)

[Drawing 21]

(a)・室温 非常に冷たい

		日射量		
		弱い	強い	非常に強い
(外気温−20)×車速	非常に冷たい	−20	−14	−9
	冷たい	−17	−11	−6
	やや冷たい	−12	−7	−4
	やや暖かい	−10	−5	−2
	暖かい	−5	−2	1

(b)・室温 冷たい

		日射量		
		弱い	強い	非常に強い
外気温×f(車速)	非常に冷たい	−13	−7	−2
	冷たい	−9	−5	0
	やや冷たい	−5	−2	2
	やや暖かい	1	2	5
	暖かい	5	8	9

(c)・室温 やや冷たい

		日射量		
		弱い	強い	非常に強い
外気温×f(車速)	非常に冷たい	−8	−3	1
	冷たい	−8	2	6
	やや冷たい	2	6	10
	やや暖かい	7	11	14
	暖かい	12	15	19

(d)・室温 やや暖かい

		日射量		
		弱い	強い	非常に強い
外気温×f(車速)	非常に冷たい	−2	3	8
	冷たい	2	7	12
	やや冷たい	7	11	16
	やや暖かい	11	15	19
	暖かい	16	20	24

(e)・室温 暖かい

		日射量		
		弱い	強い	非常に強い
外気温×f(車速)	非常に冷たい	3	8	13
	冷たい	8	13	18
	やや冷たい	13	18	23
	やや暖かい	18	23	27
	暖かい	23	27	31

[Drawing 23]

(a) :乗員付近相対湿度ーウインドウ付近相対湿度 非常に大きい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	−2	−2
	冷たい	−2	−2	−2
	やや冷たい	−2	−1	−1
	やや暖かい	−2	−1	−1
	暖かい	−1	−1	−1

(b)・乗員付近相対湿度ーウインドウ付近相対湿度 大きい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	−2	−2
	冷たい	−2	−2	−2
	やや冷たい	−2	−1	−1
	やや暖かい	−1	−1	−1
	暖かい	−1	0	0

(c)・乗員付近相対湿度ーウインドウ付近相対湿度 やや大きい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	−2	5
	冷たい	−2	−1	5
	やや冷たい	−1	−1	5
	やや暖かい	−1	0	5
	暖かい	0	0	5

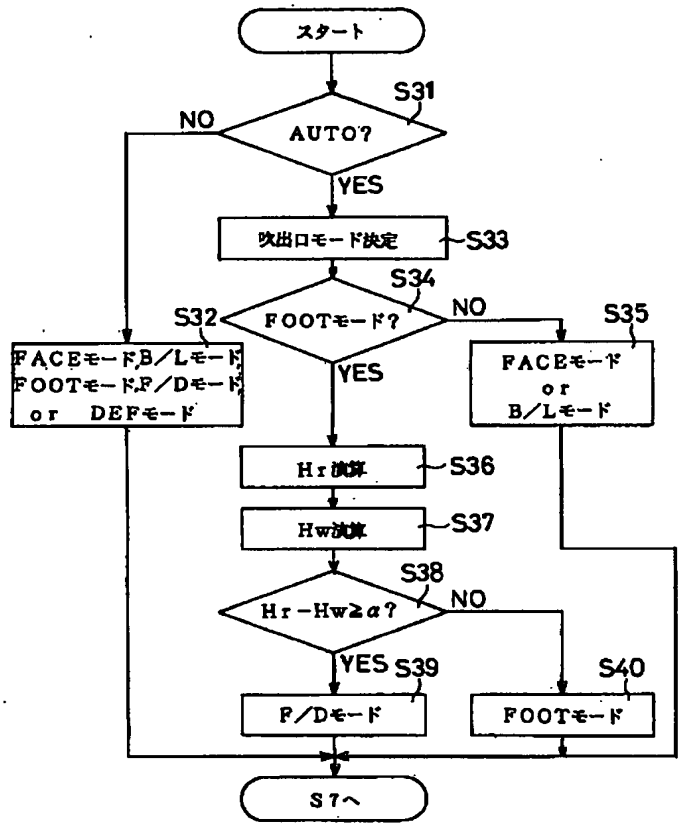
(d)・乗員付近相対湿度ーウインドウ付近相対湿度 やや小さい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	5	12
	冷たい	−2	5	12
	やや冷たい	−1	5	12
	やや暖かい	0	5	12
	暖かい	0	5	12

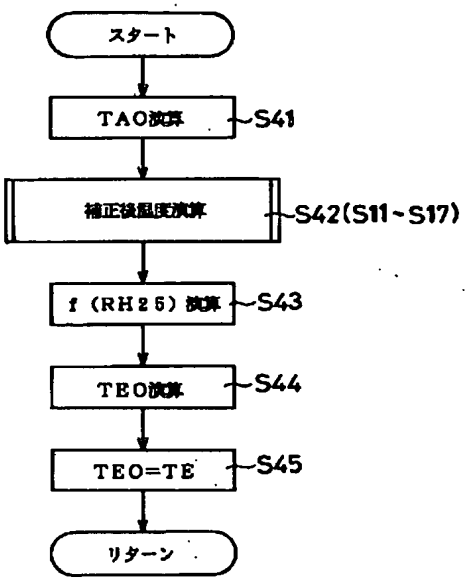
(e)・乗員付近相対湿度ーウインドウ付近相対湿度 小さい

		目標吹出温度		
		非常に小さい	小さい	大きい
外気温	非常に冷たい	−3	8	15
	冷たい	−2	8	15
	やや冷たい	−1	8	15
	やや暖かい	0	8	15
	暖かい	0	8	15

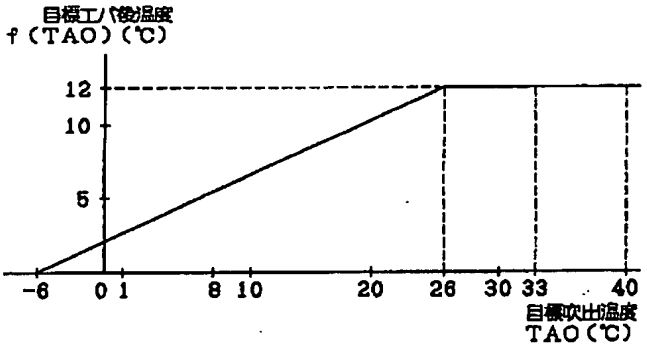
[Drawing 24]


スタート
S31
AUTO?
NO
YES
吹出口モード決定
S33
S34
FOOTモード?
NO
S35
S32
FACEモード,B/Lモード,
FOOTモード,F/Dモード,
or DEFモード
YES
FACEモード
or
B/Lモード
Hr演算
S36
Hw演算
S37
S38
Hr-Hw≧α?
NO
YES
S39
S40
F/Dモード
FOOTモード
S7へ

[Drawing 26]


スタート
TAO演算
S41
補正後温度演算
S42(S11~S17)
f(RH25)演算
S43
TEO演算
S44
TEO=TE
S45
リターン

[Drawing 28]



[Translation done.]